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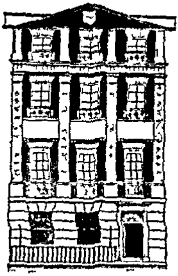

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REFERENCES AND ABBREVIATIONS

Institutions and Corporations with the right to the prefix Royal will be found under that prefix, with the exception of Medical Societies, which are separately indexed under Societies. All Universities are indexed under the word Universities. (*A*) = *Annotation,* (*C*) = *Correspondence,* (*LA*) = *Leading Article,* (*ML*) = *Medicine and the Law,* (*NI*) = *New Invention,* (*NP*) = *New Preparation,* (*O*) = *Obituary,* (*P*) = *Parliament and* (*R*) = *Review.*

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119–146	,,	31	6257	401–432	Oct.	2	6266	689–720	Dec.	4	6275
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179–210	,,	14	6259	465–496	,,	16	6268	753–784	,,	18	6277
211–242	,,	21	6260	497–528	,,	23	6269	785–816	,,	25	6278
243–276	,,	28	6261	529–560	,,	30	6270				

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BACTERIOLOGY OF WAR WOUNDS

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DADP AND OC CENTRAL PATHOLOGICAL LABORATORY, MEF

DURING the past two years a routine investigation has been made of the bacteriology of battle casualties at three base hospitals in the MEF. Earlier tests were made by a technique which was not standardised. During the campaign of El Alamein, 192 wounds were examined by a standardised technique, and the results are here given. The hospital was the —th Scottish General; it had approximately 900 beds, and there were attached a neurosurgical and orthopædic unit. Thoracic and abdominal cases were not admitted as a rule. Experience elsewhere, however, suggests that the results may be taken as representative.

TECHNIQUE AND FINDINGS

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five minutes in broth, and then cultured. This is probably particularly true in a hot dry climate. It was further observed that when cultures were taken at the bedside by a bacteriologist with a platinum loop on to a medium, hæmolytic streptococci were nearly always found; whereas the average incidence in the "swab cultures" was only 30%. Again, by means of a glass tube plugged at the end with gelatin, cultures were taken from the depths of wounds, and found to show
litative, differences from
pus on a dressing shows
us in a wound, particularly
are present. As a final
example, in this examination neither inspissated serum nor tellurite media were used. Only one or two corynebacteria are noted. But, in a former investigation at a general hospital, two years before, when corynebacteria were specifically sought, they were found with great frequency by direct culture on to tellurite plates. In this campaign, many corynebacteria were sent to the Central Pathological Laboratory for virulence testing, as wound or sore isolations. Out of 75 tested, 57 proved virulent.

It is emphasised, therefore, that this investigation was not a complete one.

The technique was as follows:

(*a*) Swabs were taken by the surgeon.
(*b*) They were moistened before culture.
(*c*) They were inoculated on to alcohol-dried blood-agar plates; drying is essential, since proteus and pyocyaneus are common.
(*d*) Cultures were also made into anaerobic media.
(*e*) The anaerobic culture was subcultured aerobically on to alcohol-dried blood-agar.

The results of these examinations are given in the table. They are divided into results on head cases, and wounds in other parts of the body. The differences in incidence of staphylococcal infection may be significant.

WOUNDS OTHER THAN HEAD WOUNDS (52 CASES)

Infecting organism	*Cases and %*
Hæm. strep.	19 (36)
Non-hæm. strep.	5 (9·6)
Hæm. *Staph. aureus*	13 (25)
Non-hæm *Staph. aureus*	15 (29)
Proteus	3 (5·7)
Pyocyaneus	6 (11·5)
Coliform bacillus	10 (19)
Staph. albus	7 (13·5)
Morph. clostridia	10 (19)
C. welchii	2 (3·8)
Strep. viridans	1 (2)
Diphtheroids	1 (2)

HEAD CASES (140)

Infecting organism	*Cases and %*
Hæm. strep.	35 (25)
Non-hæm. strep.	26 (18·5)
Hæm. *Staph. aureus*	43 (30·7)
Non-hæm. *Staph. aureus*	60 (42·8)
Proteus	14 (10)
Pyocyaneus	10 (7·1)
Coliform bacillus	35 (25)
Staph. albus	53 (38)
Morph. clostridia	25 (17·8)
C. welchii	5 (3·5)

Hæm. strep. = Hæmolytic streptococcus; Staph. = Staphylococcus; Morph. = morphological.

These cases were all battle casualties, and it is the practice in the MEF to administer sulphonamide
such cases. The advice of the

powdered drug locally.
this dosage. In nearly all cases the drug is administered, and (so far as can be made out) both locally and orally.

In 57 cases repeated examinations of the same case were made. Analysis of results shows that multiple infection of wounds is common, and that on re-examination new organisms appear and old ones disappear. The appearance of new organisms is usually interpreted as indicating hospital infection. It is difficult to discard contemporary work which supports this view. Two other factors, however, undoubtedly contribute to this finding: firstly, the fact that a strictly standardised technique is rarely if ever followed; and secondly that organisms seem to be latent in a wound, and to appear when a change in the treatment is made.

For example, detergent cationic bactericidal agents have been advocated in wound therapy, and one of these, 'Zephirol,' is much used by the Germans. Another, known as 'CTAB'—cetyl-trimethyl ammonium bromide—an exceedingly toxic and actively hæmolytic reagent, has recently been recommended, and a third, cetyl pyridinium bromide, which was kindly provided by the National Institute for Medical Research, was investigated in the course of this work. It is a most active bactericidal agent, and bacteriostatic in concentrations of 1 in 10 million against gram-positive organisms. In a series of scalp-wound infections, it was found to be worse than useless. The wounds in question had been previously dressed with sulphathiazole powder, and a 1 in 1000 solution of this drug was used instead. Where staphylococci in small numbers had previously alone been found, hæmolytic streptococci then appeared, in addition to greatly increased numbers of staphylococci. In this series dressings were carried out in the theatre, with all possible precautions. It is far more likely that the streptococci were previously present, and were kept in control by the sulphathiazole, than that they were immediately introduced on dressing.

Again, in cases treated with penicillin, succinyl sulphathiazole (sulphasuxidine), and tyrothricin, the disappearance of gram-positive organisms was nearly always associated with the appearance of pyocyaneus or proteus.

In the treatment of urinary infections with mandelic acid, a change in the infecting organism has often been noted.

Finally, patients treated with oral succinyl sulphathiazole are found to lose almost all their gram-negative fæcal flora, but the fæces then contain vast numbers of enterococci.

In deep lacerated wounds it is almost impossible to state with certainty that the organisms identified at any one time are all that are present, and the study of wounds over a two-year period suggests that the conditions obtaining in early and late wounds are in themselves sufficiently different to favour the growth in them of different organisms.

SEPSIS AS A CAUSE OF DEATH

Having established the fact that wound infection, under the favourable conditions of the El Alamein campaign, is common and various, it may be of value to ascertain how far it is responsible for death in base hospitals.

For this purpose an analysis was made by Capt. A. D. Morgan, RAMC, pathologist in the Central Pathological Laboratory, of the causes of death at the —th Scottish General Hospital during 1941–42. The autopsies were almost all performed by him, and very fully investigated and recorded. The results are of considerable general interest.

The total number of battle casualties admitted was 2472, and the number of deaths 74 (about 3%). Of these 74 cases, 32 were wounds of skull or spine. The mortality therefore from all causes in wounds other than these was very low; and the number of cases in that class dying directly of wound sepsis, so far as can be ascertained, was only 5. Sepsis nevertheless is an important cause of death in the head and spine cases.

Since an orthopædic unit was attached to this hospital, it follows that [illegible] of serious compound fractures were [illegible] course most of them were muscle wounds. No patient died from gas gangrene or tetanus; in 1939, 5 cases of gas gangrene had died.

THIS WAR AND THE LAST

The position therefore is that wound sepsis is common, but causes an insignificant death-rate outside brain, spine, chest and abdomen. This is very satisfactory, and is well recognised. The tendency sometimes is to attribute the success to sulphonamide prophylaxis and closed-plaster technique; and to suppose that a great advance has been made compared with 1918 in France. But the latter supposition receives no support from the official history.[1] In 1918, too, wound infection was rife; 10% of cases showed hæmolytic streptococci on admission, and 90% a week later—a whip often used to smite the un-Listerian dressers at base hospitals, probably quite unjustly. All wounds, it is stated, might be considered contaminated or infected. Yet the mortality-rate in 10,000 cases from all causes is given as 0·5%; and as some of this was due to gas gangrene, whose fatality-rate was 25%, there is not much left over for wound sepsis. The conditions earlier on were, undoubtedly, very different. But at the end of the war, without sulphonamides, and without closed plaster, the septic wound was not a danger to life.

It was with some surprise that I found these figures for the last war and compared them with the present series. The impression appears to be fairly general that sulphonamides, closed plaster, and the emergence or adolescence of orthopædic surgery since the last war has revolutionised infection in wounds. True, the incidence of hæmolytic streptococci in wounds taken early and late is well below the 90% level of the last war; but it has already been said that the present percentage could be made to appear higher by a more fervent search for the organisms. Even in this series of "swab cultures," it became much higher than in previous personal cultures, after they were looked for in anaerobic culture. Sepsis is all but universal, and few die of it now; the condition was apparently identical in 1918.

How much does infection matter? How long did it endure in the last war? How long does it endure now? How is it treated now? How was it treated then?

An impression has been gained that in a proportion of cases, but most certainly not in all, the doctrines of sulphonamide prophylaxis and closed plaster have closed the mind to the problem of established sepsis. Sulphonamides are given as soon as possible after wounding. Oral doses are continued for a varying period; but, sooner or later, when pus forms in a wound, they are abandoned. This appears to me to be wise. There seems to be no evidence that oral sulphonamides will control sepsis in established suppurations. They all, in varying degrees, produce nausea, loss of appetite, cyanosis, hæmaturia and anuria, skin rashes, and agranulocytosis. The special problems of neurosurgery must be here omitted.

Local wound therapy is variously attempted; certain orthopædic and neurosurgeons prosecute it vigorously, while other individuals consider it useless. It is fair to say that it is usually not possible, because of the closed-plaster technique; and the bogy of "hospital infection" tends to discourage it. The surgeon, it is thought, is the enemy of the wound. An apple a day keeps the surgeon away; plaster does it more effectively. And as for pus, the modern surgeon's attitude towards it is much the same as the modern theologian's attitude towards sin; it is not quite as bad as it used to be.

Reference to the official history shows that in the last war wound sepsis was vigorously and variously attacked by local means. It is not necessary here to recall that Carrel-Dakin treatment, acriflavine, BIPP and hypertonic saline were, one or other of them, always employed.

It would be easy to make false inferences from the figures given here. The important fact is not what organisms are in a wound, but how the wound behaves. It is important to know how long the patient is, and was, invalided; and what the result is and was. No direct comparison of that kind can be drawn from the information here given.

However, it is a fact today that a fair proportion of wounds with gross tissue damage suppurate profusely for a very long time, and this is particularly true of compound comminuted-fractures. Such suppuration may continue month after month. The picture presented by such a patient is distressing. He is emaciated, listless, devoid of appetite. He develops plaster pressure sores and bed-sores with no tendency to heal. His temperature swings from 103° to 98° F. month after month. The volume of pus daily exuded may attain levels of over 100 c.cm. The smell is most offensive; the plaster, dressings and bed are soaked in pus. Albuminuria with casts is common, and almost always he shows a profound anæmia with red-cell counts of 2·5 million, and 50% hæmoglobin.

The anæmia is only poorly responsive to transfusion; he rapidly again becomes anæmic. This anæmia with high colour-index is characteristic of prolonged sepsis in the Middle East Forces, and is entirely intractable. He has little pain, but a great deal of misery and discomfort. He rarely dies; and if he does, there is little to *explain death in many cases; he just wastes away.*

What will be the future of such a patient? How much chronic osteomyelitis will be found hereafter? How many cases of nephritis? How far will such a patient ever be restored to normal health?

CONCLUSIONS

1. A standard technique for the bacteriological examination of war wounds is desirable.
2. As in the last war, all war wounds must be considered to be contaminated or infected.
3. The commonest infections are staphylococcal. Streptococcal infection is widespread. Clostridia are often present, but clinical gas gangrene is rare. Gram-negative organisms are common, particularly in old wounds. Clinical tetanus is not found; the bacillus is often present.
4. Sulphonamide prophylaxis, local and general, is widely used, but has not prevented wound infection.
5. Infection of wounds is still the gravest problem in treatment. It is a prime cause of death in wounds of head, spine, thorax and abdomen.
6. Wounds in other parts of the body, though infected, do not often cause death from infection. Since this was also the case in 1918, there is no evidence that the position has improved. There is a general impression that sepsis is less severe and of shorter duration. But many cases, in a degree and in numbers directly proportional to the degree of tissue damage, suppurate profusely and for long periods with grave effects on the patient.
7. There seem therefore to be strong reasons for the employment in selected cases of more vigorous methods of wound treatment than those usually pursued in the laissez-faire atmosphere of closed-plaster technique.

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[1] Official Medical History of the War, Surgery, London, 1922, vol. I, p. 229.

TUBERCULOSIS IN CHILDREN*

STUDY OF 100 CASES

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ASSISTANT MEDICAL OFFICER TO THE COUNTY SANATORIUM, HAREFIELD, MIDDLESEX

THIS analysis of 100 consecutive cases at Harefield Sanatorium illustrates some of the clinical features and sequelæ of tuberculosis in infants and children.

Of these 100 children, 50 were found to have a primary complex in the lung (table I). In only 2 was the pulmonary component not evident radiologically. Parrot[1] in 1876 was the first to consider that the lesion in the lung was the primary focus and the regional glandular involvement the result. This combination of a peripheral focus with enlargement of the associated glands was called by Ranke[2] the primary complex (fig. 1). Many people minimise the importance of these primary infections and some even consider treatment unnecessary.

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* Based on an address given to the Tuberculosis Officers Association of the Middlesex County.

1. Parrot, J. *C R Soc Biol. Paris*, 1876, 18, 308
2. Ranke, K. E. Ausgewählte Schriften zur Tuberkulosepathologie, Berlin, 1928.

In this series the primary lung lesions were distributed as follows: right lung 28 (upper zone 7, mid-zone 6, lower zone 12, two zones combined 3); left lung 19 (upper zone 8, mid-zone 3, lower zone 7, two zones combined 1); both lungs 1; glands only 2. Examination [illegible] tuberculin reaction without apparent illness or demonstrable radiological lesions, though a calcified focus may later be found in the lung or root glands. This outcome may be due to a high degree of resistance or variation in dose or virulence of infection; others—such as those reported here—show constitutional disturbance. Of the 50 children with a primary complex 35 (70%) had symptoms, the commonest being cough, fever, malaise, lassitude, loss of weight and gastro-intestinal upsets; in 5 cases erythema nodosum was noted, and in 2 each asthma, pain and phlyctenular conjunctivitis were present (table II). It seems reasonable to suppose that the children with demonstrable lesions or definite symptoms have an increased suscep[illegible] or larger dose. often long treat[illegible]

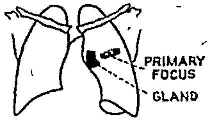
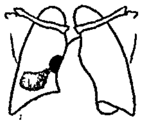


Fig. 1—Primary complex.



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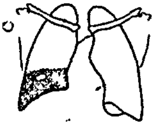

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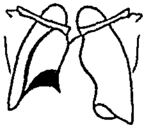

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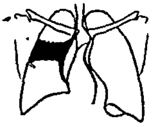
Fig. 2—Perifocal infiltration. Fig. 3—Same case: cavitation.

Fig. 4—Same case after pneumothorax and phrenic crush; atelectasis, lower lobe; cavity not now seen.



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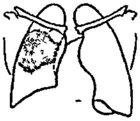

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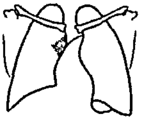

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Fig. 5—Area of pulmonary collapse with displacement of mediastinum to the right. Fig. 6—Same case. spread of lesion, collapse less definite.

Fig. 7—Same case: shrinkage of lesion after lipiodol.

well marked (fig. 2). In others, an element of pulmonary collapse due to bronchial obstruction by the enlarged glands ("epituberculosis") may complicate the picture (fig. 5). Perifocal infiltrations may not be as benign as has been [illegible] ay cavitate (fig. 3) with corre- [illegible] onstitutional disturbance and [illegible] dissemination—a catastrophe [illegible] prompt recognition and treatment.

TABLE I—FINDINGS IN 100 TUBERCULOUS CHILDREN ADMITTED TO SANATORIUM

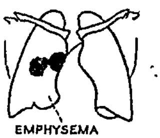
Lesion	Total cases	Boys	Av. age	Gastric lavage positive		Contacts discovered	Symptoms present
				Total cases	Boys		
			(yr.)				
Primary .. .	50	24	5·7	15 (30)	6	41 (82)	35 (70)
Disseminated .	18	11	6	7 (39)	0	8 (44)	16 (88)
Pleural effusion ..	14	9	9	2 (14)	1	5 (36)	14 (100)
Adult type ..	8	0	12·4	6 (75)	0	5 (62)	6 (75)
Cervical adenitis	7	3	6·2	2 (28)	1	1 (14)	7 (100)
Peritonitis ..	3	1	10·6	1 (33)	1	0	3 (100)

The figures in parentheses are percentages.

TABLE II—SYMPTOMS CAUSING SPONTANEOUS COMPLAINTS

Symptom	Cases	Lesion					
		Primary	Disseminated	Pleural effusion	Adult type	Cervical adenitis	Peritonitis
Cough	29	13	3	7	5	0	1
Fever	17	8	3	6	0	0	0
Malaise, lassitude ..	16	7	2	2	2	0	3
Loss of weight ..	7	4	1	1	1	0	0
Gastro-intestinal ..	14	6	3	2	0	0	3
Erythema nodosum	7	5	1	1	0	0	0
Asthma	2	2	0	0	0	0	0
Pain	8	2	0	4	2	0	0
Large glands ..	10	0	3	0	0	7	0
Bone or joint affected	4	0	3	0	1	0	0
Phlyctenular conjunctivitis ..	3	2	0	1	0	0	0
Sinuses	2	0	1	0	0	1	0

The parenchymal lesion may spread (fig. 6). Indeed some cases show considerable fluctuation before resolving. The enlarged glands may obstruct a bronchus and if obstruction is incomplete pressure emphysema ma develop (fig. 8), causing severe dyspnœa with the clinic picture of acute asthma. Complete obstruction produces atelectasis (fig. 9) and the symptoms are relieved.



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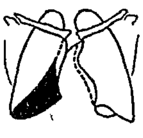

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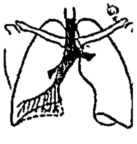

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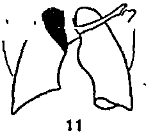
Fig. 8—Partial obstruction of right lower lobe, with pressure emphysem causing depression of the inner part of the diaphragm on the right.

Fig. 9—Same case: development of atelectasis.

Fig. 10—Same case: bronchogram showing crowding of bronchi in right lowe lobe.

Mixtures of the two processes—parenchymal spread with bronchial obstruction—may be found. We have demonstrated the obstruction from glandular pressure; occasionally a gland may be seen ulcerating through the bronchial wall. Toxæmia may decrease when drainage of the affected lung is improved. This was seen in one case when, after an injection of iodised oil into the bronchi, the gastric lavage which for many months had been negative became positive, toxæmia diminished and radiologically the lung lesion became smaller (fig. 7). Permanent atelectasis may sometimes result (fig. 11) and the bronchus may become stenosed. Iodised oil injection into these atelectatic areas has shown in some cases crowding of the bronchi but no bronchial dilatation (fig. 10), though this may also be present in some cases (fig. 12). These observations may throw some light on the subsequent development of bronchiectasis, and symptoms may be produced by inflammation around the dilated bronchi or the retention of secretions in them. Childhood infection may thus produce symptoms and disability at the time



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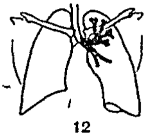

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Fig. [illegible]

Fig. [illegible] of left upper lobe.

tained, was only 5. Sepsis nevertheless is an important cause of death in the head and spine cases.

Since an orthopædic unit was attached to this hospital, it follows that a high percentage of serious compound fractures were admitted, and of course most of them were muscle wounds. No patient died from gas gangrene or tetanus; in 1939, 5 cases of gas gangrene had died.

THIS WAR AND THE LAST

The position therefore is that wound sepsis is common, but causes an insignificant death-rate outside brain, spine, chest and abdomen. This is very satisfactory, and is well recognised. The tendency sometimes is to attribute the success to sulphonamide prophylaxis and closed-plaster technique; and to suppose that a great advance has been made compared with 1918 in France. But the latter supposition receives no support from the official history.[1] In 1918, too, wound infection was rife; 10% of cases showed hæmolytic streptococci on admission, and 90% a week later—a whip often used to smite the un-Listerian dressers at base hospitals, probably quite unjustly. All wounds, it is stated, might be considered contaminated or infected. Yet the mortality-rate in 10,000 cases from all causes is given as 0·5%; and as some of this was due to gas gangrene, whose fatality-rate was 25%, there is not much left over for wound sepsis. The conditions earlier on were, undoubtedly, very different. But at the end of the war, without sulphonamides, and without closed plaster, the septic wound was not a danger to life.

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How much does infection matter? How long did it endure in the last war? How long does it endure now? How is it treated now? How was it treated then?

An impression has been gained that in a proportion of cases, but most certainly not in all, the doctrines of sulphonamide prophylaxis and closed plaster have closed the mind to the problem of established sepsis. Sulphonamides are given as soon as possible after wounding. Oral doses are continued for a varying period; but, sooner or later, when pus forms in a wound, they are abandoned. This appears to me to be wise. There seems to be no evidence that oral sulphonamides will control sepsis in established suppurations. They all, in varying degrees, produce nausea, loss of appetite, cyanosis, hæmaturia and anuria, skin rashes, and agranulocytosis. The special problems of neurosurgery must be here omitted.

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However, it is a fact today that a fair proportion of wounds with gross tissue damage suppurate profusely for a very long time, and this is particularly true of compound comminuted fractures. Such suppuration may continue month after month. The picture presented by such a patient is distressing. He is emaciated, listless, devoid of appetite. He develops plaster pressure sores and bed-sores with no tendency to heal. His temperature swings from 103° to 98° F. month after month. The volume of pus daily exuded may attain levels of over 100 c.cm. The smell is most offensive; the plaster, dressings and bed are soaked in pus. Albuminuria with casts is common, and almost always he shows a profound anæmia with red-cell counts of 2·5 million, and 50% hæmoglobin.

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CONCLUSIONS

1. A standard technique for the bacteriological examination of war wounds is desirable.
2. As in the last war, all war wounds must be considered to be contaminated or infected.
3. The commonest infections are staphylococcal. Streptococcal infection is widespread. Clostridia are often present, but clinical gas gangrene is rare. Gram-negative organisms are common, particularly in old wounds. Clinical tetanus is not found; the bacillus is often present.
4. Sulphonamide prophylaxis, local and general, is widely used, but has not prevented wound infection.
5. Infection of wounds is still the gravest problem in treatment. It is a prime cause of death in wounds of head, spine, thorax and abdomen.
6. Wounds in other parts of the body, though infected, do not often cause death from infection. Since this was also the case in 1918, there is no evidence that the position has improved. There is a general impression that sepsis is less severe and of shorter duration. But many cases, in a degree and in numbers directly proportional to the degree of tissue damage, suppurate profusely and for long periods with grave effects on the patient.
7. There seem therefore to be strong reasons for the employment in selected cases of more vigorous methods of wound treatment than those usually pursued in the laissez-faire atmosphere of closed-plaster technique.

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[1] Official Medical History of the War: Surgery, London, 1922, vol. I, p. 229.

TUBERCULOSIS IN CHILDREN*

STUDY OF 100 CASES

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THIS analysis of 100 consecutive cases at Harefield Sanatorium illustrates some of the clinical features and sequelæ of tuberculosis in infants and children.

Of these 100 children, 50 were found to have a primary complex in the lung (table I). In only 2 was the pulmonary component not evident radiologically. Parrot[1] in 1876 was the first to consider that the lesion in the lung was the primary focus and the regional glandular involvement the result. This combination of a peripheral focus with enlargement of the associated glands was called by Ranke[2] the primary complex (fig. 1). Many people minimise the importance of these primary infections and some even consider treatment unnecessary.

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* Based on an address given to the Tuberculosis Officers Association of the Middlesex County

[1] Parrot, J. *C.R Soc Biol Paris*, 1876, 18, 308.

[2] Ranke, K. E. Ausgewahlte Schriften zur Tuberkulosepathologie, Berlin, 1928.

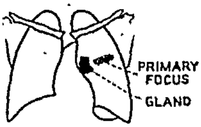
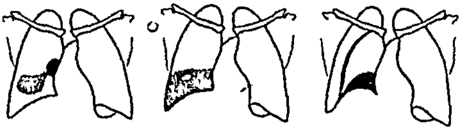


Fig. 1—Primary complex.

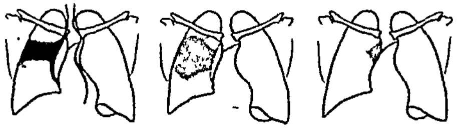
n this series the primary lung lesions were distributed s follows: right lung 28 (upper zone 7, mid-zone 6, ower zone 12, two zones combined 3); left lung 19 pper zone 8, mid-zone 3, lower zone 7, two zones combined 1); both lungs 1; glands only 2. Examination [illegible] tuberculin reaction without apparent illness or demonstrable radiological lesions, though a calcified focus may later be ound in the lung or root glands. This outcome may be [illegible] variation in dose or [illegible] as those reported [illegible]. Of the 50 children vith a primary complex 35 (70%) had symptoms, the commonest being cough, fever, malaise, lassitude, loss of reight and gastro-intestinal upsets; in 5 cases erythema odosum was noted, and in 2 each asthma, pain and hlyctenular conjunctivitis were present (table II). It eems reasonable to suppose that the children with lemonstrable lesions or definite symptoms have an ncreased suscep [illegible] r larger dose. ften long treat [illegible]



2 3 4

Ig. 2—Perifocal infiltration. Fig. 3—Same case: cavitation.

Ig. 4—Same case after pneumothorax and phrenic crush; atelectasis, lower lobe; cavity not now seen.



5 6 7

Ig. 5—Area of pulmonary collapse with displacement of mediastinum to the right. Fig. 6—Same case: spread of lesion, collapse less definite.

Fig. 7—Same case: shrinkage of lesion after lipiodol.

well marked (fig. 2). In others, an element of pulmonary collapse due to bronchial obstruction by the enlarged glands ("epituberculosis") may complicate the picture (fig. 5). Perifocal infiltrations may not be as benign as has been generally thought and may cavitate (fig. 3) with corresponding increase in constitutional disturbance and iability to bronchogenic dissemination—a catastrophe sometimes averted by prompt recognition and treatment.

ABLE I—FINDINGS IN 100 TUBERCULOUS CHILDREN ADMITTED TO SANATORIUM

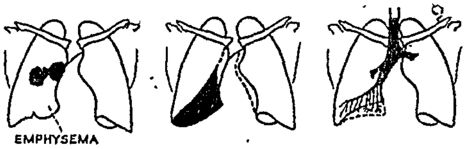
Lesion	Total cases	Boys	Av. age	Gastric lavage positive		Contacts discovered	Symptoms present
				Total cases	Boys		
			(yr.)				
Primary	50	24	5·7	15 (30)	6	41 (82)	35 (70)
Disseminated ..	18	11	6	7 (39)	3	8 (44)	16 (88)
Pleural effusion ..	14	9	9	2 (14)	1	5 (36)	14 (100)
Adult type ..	8	0	12·4	6 (75)	0	5 (62)	6 (75)
Cervical adenitis	7	3	6·2	2 (28)	1	1 (14)	7 (100)
Peritonitis ..	3	1	10·6	1 (33)	1	0	3 (100)

The figures in parentheses are percentages.

TABLE II—SYMPTOMS CAUSING SPONTANEOUS COMPLAINTS

Symptom	Cases	Lesion					
		Primary	Disseminated	Pleural effusion	Adult type	Cervical adenitis	Peritonitis
Cough	29	13	3	7	5	0	1
Fever	17	8	3	6	0	0	0
Malaise, lassitude ..	16	7	2	2	2	0	3
Loss of weight ..	7	4	1	1	1	0	0
Gastro-intestinal ..	14	6	3	2	0	0	3
Erythema nodosum	7	5	1	1	0	0	0
Asthma	2	2	0	0	0	0	0
Pain	8	2	0	4	2	0	0
Large glands ..	10	0	3	0	0	7	0
Bone or joint affected	4	0	3	0	1	0	0
Phlyctenular conjunctivitis ..	3	2	0	1	0	0	0
Sinuses	2	0	1	0	0	1	0

The parenchymal lesion may spread (fig. 6). Indeed some cases show considerable fluctuation before resolving. The enlarged glands may obstruct a bronchus and if obstruction is incomplete pressure emphysema may develop (fig. 8), causing severe dyspnœa with the clinical picture of acute asthma. Complete obstruction produces atelectasis (fig. 9) and the symptoms are relieved.



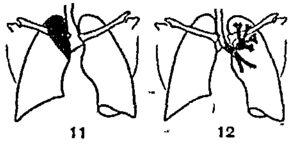
8 9 10

Fig. 8—Partial obstruction of right lower lobe, with pressure emphysema causing depression of the inner part of the diaphragm on the right.

Fig. 9—Same case: development of atelectasis.

Fig. 10—Same case: bronchogram showing crowding of bronchi in right lower lobe.

Mixtures of the two processes—parenchymal spread with bronchial obstruction—may be found. We have bronchoscoped some cases and demonstrated the obstruction, sometimes noting œdema of the mucosa and sometimes distortion from glandular pressure; occasionally a gland may be seen ulcerating through the bronchial wall. Toxæmia may decrease when drainage of the affected lung is improved. This was seen in one case when, after an injection of iodised oil into the bronchi, the gastric lavage which for many months had been negative became positive, toxæmia diminished and radiologically the lung lesion became smaller (fig. 7). Permanent atelectasis may sometimes result (fig. 11) and the bronchus may become stenosed. Iodised oil injection into these atelectatic areas has shown in some cases crowding of the bronchi but no bronchial dilatation (fig. 10), though this may also be present in some cases (fig. 12). These observations may throw some light on the subsequent development of bronchiectasis, and symptoms may be produced by inflammation around the dilated bronchi or the retention of secretions in them. Childhood infection may thus produce symptoms and disability at the time



11 12

Fig. 11— [illegible]

Fig. [illegible] of left upper lobe.

or in later life. Gastric lavage was positive in 30 % of the patients with primary lesions; symptoms—by which is meant only spontaneous complaints either by the child or parent—were present in 70 %, quite a high figure.

DISSEMINATED LESIONS

Dissemination of bacilli is probably common and the factors determining the presence or absence of demonstrable lesions are often difficult to understand. Acute miliary dissemination with severe toxæmia and fairly rapid termination in meningitis is familiar to all. A similar picture with a longer course and occasional recovery is also seen.

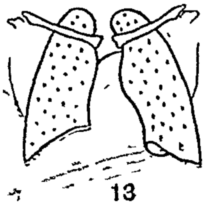
One fatal case showed remarkable clinical and pathological features. The illness was long and the presenting symptoms were abdominal; the general condition remained good considering the long-continued fever and at one stage recovery seemed probable until further dissemination involved the meninges. At autopsy, disseminated foci were found in the lungs in various stages, some fibrosed, some calcified and some recent. A partly calcified and partly caseous primary complex was observed in the lung. Old calcified and recent lesions were found in the spleen and liver; there was also involvement of the spine.

Another such case is still alive after 3 years of illness, and the picture in the lungs showed miliary lesions (fig. 13) which subsequently cleared considerably (fig. 14). There are calcified foci in the abdomen and there are also lesions in an elbow, a knee, and a hip. This case presented difficulties in diagnosis, and unexplained pyrexia, infectious enteritis and tuberculous peritonitis were in turn diagnosed at different stages.

In these 2 cases there was no known contact.

More isolated disseminations may be seen, some single and some multiple. Thus a joint or a bony lesion may first attract attention. In the case of synovial tubercle, in my experience, the lesion may be relatively painless for a long time. In one child swelling of a knee was first observed by a nurse while she was washing the child. No complaint of pain was made either at rest or on movement of the knee. It is noteworthy that the secondary focus may progress while the primary lesion is healing. Fortunately both primary and secondary lesions may heal. Multiple dactylitis is present in one case and there are 3 children with spinal caries. These lesions need long treatment, possibly lasting years, and fluctuation in the course of the illness is to be expected.

Pleural effusion.—In all cases of effusion symptoms were present, such as pain, fever, dyspnœa and variable constitutional upset. The effusion may arise early in the disease and may be the result of a focus directly under the pleura. Allergy may play a part. One of our cases with a primary lung lesion developed an effusion after being in hospital some months. In another an effusion which had almost resolved formed afresh, being preceded by pain in the chest and constitutional disturbance. Absorption may be slow and many months may elapse before it is complete. No lesion may then be seen in the underlying lung or a primary complex may be present (figs. 15 and 16). Diagnostic puncture only has been carried out, except in one case where the effusion was aspirated on account of respiratory distress. The prognosis in this group appears good. A caseous focus may rupture into the pleura and a bacillary effusion form. These have a more serious prognosis and may become secondarily infected. In one child a secondarily infected pleural effusion was complicated by a spontaneous pneumothorax (fig. 17). In all cases, in my [illegible] air replacement is contra-indicated.



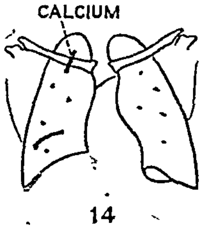
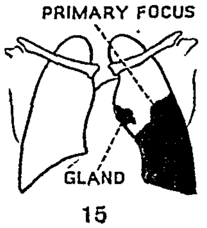


Fig. 13—Chronic miliary lesions.

Fig. 14—Same case, a year later; clearing lesions.



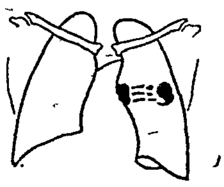
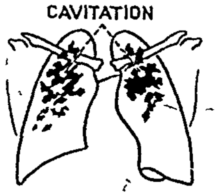


Fig. 15—Pleural effusion with primary lung focus at its upper level.

Fig. 16—Same case after absorption of fluid, showing primary complex in left lung.



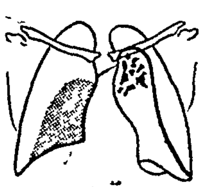


Fig. 18—Adult type of disease.

Fig. 19—Same case after bilateral artificial pneumothorax.

Peritonitis.—Abdominal lesions have been few; they may vary from ulceration of the intestine—indicated by diarrhœa and bacilli in the stools—to tuberculosis of the lymphatic glands and ascitic tuberculosis. Symptoms vary accordingly; some may simulate appendicitis and the diagnosis be made at operation. There are only 3 cases in this series and recovery was well on the way before admission so I will only remark that the incidence due to bovine bacilli should decrease with efficient pasteurisation of milk, but human bacilli should not be forgotten as a cause.

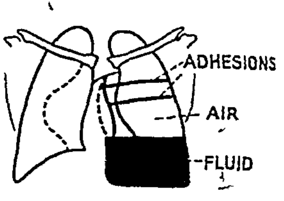


Fig. 17—Tuberculous pyopneumothorax.

Cervical glands.—These cases present as a rule with swelling in the neck, often painless or comparatively so, accompanied by variable degrees of ill health. Abscess formation is common, and scrofulous lesions may result from ulceration. The glands affected depend on the portal of entry of the bacilli (I am not speaking of cases where the glands may be affected by hæmatogenous spread from other parts of the body), though spread down the lymphatic chain may make the site of entry difficult to determine. When the tonsillar glands are affected we sometimes select a propitious time and remove the tonsils. In one case the glands then subsided. Tonsils and adenoids are sectioned for histological evidence of tuberculosis. In our few cases no lesions were found but they are recorded in varying incidence by others. Operation is not without risk and should only be undertaken in selected cases. In one case the mediastinal glands enlarged after operation and subsequently subsided.

Adult-type lesions.—In the 8 cases girls preponderated; 6 were known contact cases. The clinical features are similar to those found in adults. Collapse methods—unilateral and bilateral pneumothorax, phrenic crush and extrapleural pneumothorax—have been used where indicated, and the results so far are encouraging. Some of the cases on admission had extensive disease (figs. 18 and 19). The relation between them and their primary infection merits serious study; one primary case with cavitation, had it not been treated, might have appeared in this group (figs. 3 and 4).

Gastric lavage is a useful diagnostic adjunct but not, in my opinion, an essential one; it has not been related to the clinical severity of the cases in this series. I use it as one of the criteria for deciding discharge home, negative lavage over some months being desirable. In some of our cases it has taken a lon[illegible] for the lavage to become neg[illegible] are done on these children and have proved of especial value in following the activity of the primary lesions.

SUMMARY

A series of 100 consecutive cases of tuberculosis in children is described; 50 of them had demonstrable primary pulmonary lesions only.

From the data it seems that supervision and treatment in an institution is desirable for children with primary pulmonary lesions; hospital treatment is of course necessary for those with other tuberculous lesions.

I am obliged to Dr. H. M. C. Macaulay, medical officer of health for Middlesex, for permission to publish this paper, to Dr. K. R. Stokes and Dr. L. E. Houghton for criticism, to Dr. E. Nassau for the pathological examinations, Mr. T. Holmes Sellors, FRCS, for the bronchoscopies, Dr. L. Blair for radiography, and the ward staff for their coöperation.

LISTERIA* MONOCYTOGENES
ISOLATED FROM A CASE OF INFECTIOUS MONONUCLEOSIS

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THE case of glandular fever here reported had a typical history with swollen lymphatic glands, pharyngitis, fever of 3 weeks' duration and a mononucleosis. The enlarged glands did not fully subside nor the blood-picture return to normal until the 5th week. At no period were there signs of involvement of the meninges or brain.

CASE-RECORD

A Cambridge medical student, aged 20, noticed on waking that the glands in the posterior triangle of the neck were swollen and firm, but not particularly tender. The same evening he had an attack of shivering with muscular pains, frontal headache and general malaise. Next day he went to his home in the country, 15 miles distant, and was put to bed. His evening temperature rose to 102·6° F. He gradually improved and on the 11th day was afebrile and got up. There was a prompt recrudescence of all symptoms, including the lymphadenitis, the inguinal group now becoming involved in addition to the cervical. His throat became sore and swallowing was very painful. His temperature rose again, to 102° F. No rash was observed. On the 14th day of the disease, when the recurrence was at its height, a sample of vein blood was taken. The acute pharyngitis persisted for a week and his subsequent clinical history was the usual one of slow convalescence with residual lassitude and weakness. He was febrile for 3 weeks and in bed for a month. At the 5th week [illegible] ut traces of lethargy [illegible] on his studies were [illegible]

Blood-picture.—The white-cell counts are shown in table I. The picture on the 14th day was typical of infectious mononucleosis. The lymphocytes and monocytes together comprised 87% of the total white cells. The characters of many of these mononuclear cells were those commonly found in glandular fever, the distinction between the large lymphocyte and the monocyte being difficult. The cells of this indeterminate group had a round, oval or slightly indented nucleus and an abundant bluish cytoplasm, the colour in a small percentage being very deeply basophilic. The fine reddish [illegible] per c.mm.). The count done on the 23rd day, when the patient had just become afebrile and the glandular enlargement was subsiding, showed an identical qualitative picture, though the absolute number of mononuclears was halved. The granulocytes at this stage were very low—1000 per c.mm. sulphapyridine had been used in treatment but the doses were not large and were not continued for more than a week. This granulocyte leucopenia was still present on the 38th day, when convalescence was established and the glandular enlargement had almost disappeared. There were then only 1245 granular cells per c.mm. The mononuclear group were not greatly reduced from the high count of the 23rd day, but there was a striking change in the type of cell. Within the mononuclears the abnormal lymphocyte-monocyte group was down to 365 cells per c.mm. (compared with 6230 and 3200 in the two previous counts), while lymphocytes of normal staining reaction and morphology now constituted almost the whole of the mononuclear leucocytosis.

TABLE I—PATIENT'S LEUCOCYTE COUNTS

Day of disease	14th		23rd		38th	
Total white cells per c.mm.	17,800		8000		7300	
	%	abs.	%	abs.	%	abs.
Polymorph. neut.	12·5	2225	10·0	800	15·5	1130
" eosinoph.	0	0	0	0	1·0	75
" basoph.	0·5	90	2·5	200	0·5	40
Lymph. (small, int., large)	35·0	7475	35·0	2800	74·0	5400
Lympho.-mono. (abnorm. gr.) ..	42·0	6230	40·0	3200	5·0	365
Monocytes	10·0	1780	12·5	1000	4·0	290

Paul-Bunnell test.—The small quantity of serum available from the 14th day blood sample was used for the Paul and Bunnell (1932) sheep red-cell heterophile agglutinin test. This gave positive agglutination to a titre of 1/2048 (serum dilution). This result affords very strong confirmatory evidence of glandular fever. The patient gave no history of having received injections of horse serum.

TABLE II—BIOCHEMICAL REACTIONS OF ORGANISM CULTURED FROM PATIENT'S BLOOD

	Strain of organism			
	B Ch-G	58-XXIII	Schultz, LLS	Gibson, EF
Monosaccharides				
Pentoses—				
Arabinose ..	O	O	O	O
Xylose ..	O	A(tr)	A(tr)	A(tr)
Hexoses—				
Glucose ..	A	A	A	A
Galactose ..	A	A	A	A
Disaccharides				
Saccharose ..	A	A(late)	A(late)	A(late)
Maltose ..	A	A	A	A
Lactose ..	A(late)	A(late)	A(late)	A(late)
Polysaccharides				
Starch	A	O	O	O
Inulin ..	O	O	O	O
Dextrin ..	A	A	A	A
Alcohols				
Mannite ..	O	O	O	O
Dulcite ..	O	O	O	O
Litmus milk ..	A(tr)	A(tr)	A(tr)	A(tr)
Gelatin	O	O	O	O
Indol	O	O	O	O
Methyl red test	+	+	+	+
Voges-Proskauer reaction ..	O	+ (tr)	+ (tr)	+ (tr)

A = acid production without gas. tr = trace. + = positive reaction. O = no change.

ISOLATION OF *List. monocytogenes* FROM THE BLOOD

The small amount of arm-vein blood taken into a dry [illegible] s [illegible] 3 [illegible] d [illegible] ing 100 c.cm. of nutrient broth, to which the adjuvant 'L[illegible] before autoclaving to [illegible] Reported tests (von Ha[illegible] at this substance is an [illegible] destroys the normal bactericidal power of human blood for a large number of pathogenic organisms.

The broth was incubated aerobically at 23° C., and after 6 days, when visible turbidity was well-marked in the [illegible] d out on blood-agar. Prof[illegible] plates after overnight aero[illegible] isolated colonies were about 1–1·5 mm. in diameter, round, convex, smooth, glistening and transparent, with entire edges. They were butyrous in consistency and emulsified readily. Small zones of hæmolysis which subsequently became complete surrounded the colonies. No rough variants [illegible] ally when grown in glucose broth at 23° C. rather than at 37°). The morphological and cultural characters of the organism strongly suggested *List. monocytogenes.* Its biochemical activities were therefore investigated and compared with those of three stock strains of this organism—namely, "58-XXIII-1924" (original Cambridge guineapig strain: Murray, Webb and Swann 1926) "Schultz LLS-1933" (human strain from California; Schultz, Terry, Brice and Gebhardt 1934, Webb and Barber 1937); and "Gibson EF-1934" (human strain

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[*] The [illegible] irie (1927), was dis[illegible] l International Con[illegible] York City, on the [illegible] sed by Jahn in 1900 for a mycetozoan. It was therefore proposed (Pirie 1940) that the name *Listeria* be substituted.

from Scotland: Gibson 1935, Webb and Barber 1937). The comparison is given in table II, the strain of organism from the present case being termed "BCh-G."

The results obtained with strain BCh-G showed only minor divergencies from those of the three stock laboratory strains and are compatible with true identity of species among the four strains under comparison.

AGGLUTINATION TESTS

Cross-agglutination tests between the organism BCh-G and *List. monocytogenes* (original rodent strain 58-XXIII) were next carried out. The results are given in table II.

Antisera were prepared in rabbits by intravenous injections of flagellar antigens. The latter are obtained in greatest concentration by growing the organisms in 1% glucose broth, incubated for 18 hours at 23° C. Growth at this low temperature, as McGaughey, quoted by Paterson (1939) has shown, produces actively motile (flagellated) listeria in great numbers. The broth bottles, uniformly turbid, were diluted with sterile broth to moderate density (bacterial count of 1000 million per c.cm.). The cultures were killed by the addition of formaldehyde to a concentration of 0·25%. The rabbits were given a first dose of 0·5 c.cm. and a second dose of 1 c.cm. after 21 days, and the serum was harvested from ear-vein blood on the 21st day after the second injection. It was not heated and was stored at 4° C. without preservative. Suspensions for agglutination were prepared as for inoculation and the reactions between antigen and antibody read after an hour in the 53° C. water-bath, and again after 4 hours and 24 hours. The later readings were always identical with the first. Clumping was of the large, soft flake type, characteristic of flagellar agglutination. The titres given are in terms of the final dilution, after addition of the suspension.

TABLE III—AGGLUTINATION TESTS

Suspension of organism	Titre of antiserum prepared against	
	58-XXIII (rab. 41/33)	BCh-G (rab. 41/37)
58-XXIII	1/50,000	1/25,000
BCh-G	1/50,000	1/25,000

The titre of agglutinins obtained in these two sera was high, the 58-XXIII rabbit outdistancing the BCh-G rabbit by a one-tube end point (doubling dilutions were employed in the tests). The table shows a cross-agglutination result which gives no indication of any antigenic differences in the two strains. Each was agglutinated by the other's antiserum to full titre.

Agglutinin-absorption tests were done, using the strong 1/50,000 58-XXIII antiserum. Table IV shows the results.

For absorption, thick emulsions containing between 50,000 and 100,000 million organisms per c.cm. were prepared for the washed deposit of formolised broth cultures grown at 23° C. Two c.cm. of emulsion and two c.cm. of antiserum diluted 1/5 were mixed and heated in the 53° C. water bath for 4 hours, the tubes being inverted every 30 minutes. After storing at 4° C. overnight the mixtures were centrifuged and the supernatant fluid (now representing an antiserum dilution of 1/10) was mixed with an equal amount of a fresh thick emulsion and the whole process repeated for this second absorbing dose. The resulting supernatant fluid (now representing antiserum diluted 1/20) was set up in the usual way against an ordinary suspension of the homologous organism, to test for the presence of residual antibody.

TABLE IV—AGGLUTININ-ABSORPTION TESTS

58-XXIII serum (titre 1/50,000)	Titre after absorption
Absorbed with 58-XXIII suspension	0
,, ,, BCh-G ,,	1/50–1/100 (tr)

The absorption tests indicate that the BCh-G organism has a flagellar antigenic constitution almost, but not quite, identical with that of the rodent *List. monocytogenes*, since BCh-G was apparently not capable of removing from the test antiserum every trace of flagellar antibody which the homologous organism had induced. The difference in flagellar antigens is, however, slight; of an order which indicates strain variety within species identity.

The BCh-G strain will be tested against monospecific flagellar and somatic antisera, prepared by absorption methods for the purpose of distinguishing small variations in the antigen complex, and the details published later. Several investigators have examined strains of listeria to determine the antigenic structure. Paterson (1939, 1940a) used both flagellar and somatic antisera and concluded that four types of listeria could be distinguished. He was unable, however, to correlate these types with the zoological species of the hosts or with the geographical distribution of the sites of discovery.

TABLE V—LEUCOCYTES IN RABBITS AFTER INTRAVENOUS INOCULATION OF BCH-G

—	Total white cells	Polymorphs		Lymphocytes		Monocytes	
		%	abs.	%	abs.	%	abs.
BCh-G: 37 million i.v. (rab. 41/75 : 1560 g.)							
Pre-injection count	7000	38·0	2660	58·0	4060	4·0	280
After 48 hr. ..	10,900	38·0	4141	44·0	4795	18·0	1960
,, 72 ,, ..	12,000	30·0	3600	38 0	4500	*32·0*	*3840*
,, 96 ,, ..	10,900	29·5	3215	55·0	5995	15·5	1690
,, 6 days ..	10,400	39 0	4055	49·0	5095	12·0	1250
,, 9 ,, ..	9200	43·5	4370	47·5	4000	9·0	830
,, 12 ,, ..	7200	35·0	2520	59 0	4250	6·0	430
BCh-G: 150 million i.v. (rab. 41/76 : 2370 g.)							
Pre-injection count	8700	30·0	2610	64·0	5570	6·0	520
After 48 hr. ..	12,300	19 0	2340	59·0	7255	22·0	2705
,, 72 ,, ..	19,600	36·0	7050	34·0	6665	30·0	5880
,, 96 ,, ..	20,700	30·0	6210	38·5	7970	*31·5*	*6520*
,, 6 days ..	12,600	34·0	4285	48 0	6050	18·0	2265
,, 9 ,, ..	9800	29·0	2840	59·0	5785	12·0	1175
,, 12 ,, ..	8800	30·5	2685	60·0	5280	9·5	835

BIOLOGICAL TESTS

Production of a monocytosis in rabbits.—The experimental inoculation of rabbits with pure cultures of *List. monocytogenes* was shown on the first discovery of this organism to result in a rise in the monocytes of the circulating blood (Murray, Webb and Swann 1926). This finding has been repeatedly confirmed, confirmed indeed for every strain subsequently isolated, and failure to reproduce the reaction would cast serious doubt on the identification of an organism as a member of the listeria group. The BCh-G strain was thus tested in two rabbits.

Motile glucose-broth cultures were prepared, diluted if necessary with sterile broth, and injected, living, into the ear veins of the rabbits. White-cell counts were made before and after injections.

Both of the doses chosen for injection proved to be sublethal and produced a circulating monocytosis, the peak of the rise in the first rabbit coming at 72 hours after injection and in the second at 96 hours. In the animal receiving the larger dose the degree of response, a rise in monocytes from 280 to 6520 per c.mm., is equal to the average found in the first experimental inoculations at Cambridge, though not approaching the record rabbit of that series in which a pre-injection count of 230 monocytes per c.mm. was increased to 15,100 per c.mm. (56% of 27,000 white blood-cells).

Rabbit and mouse lesions after lethal doses.—In the experimental disease in rabbits the most conspicuous lesion is a fine focal necrosis of the liver, in the typical case appearing as a uniform white mottling or speckling, pin-point to pin-head in size, covering the whole surface of the liver and extending throughout its substance. Three rabbits were given lethal doses of the BCh-G organism.

Motile living glucose-broth cultures grown at 23° C. were used for inoculation. The rabbits were all young adults weighing between 1500 and 2000 g. Rabbits 41/60 and 41/61 received 450 million organisms each intravenously and died at 96 hours and 108 hours respectively. Rabbit 41/71 was given 750 million organisms and was killed at 72 hours, being then moribund.

Focal necroses in the liver were found post mortem in all three rabbits. They were least well marked in the first animal which died 96 hours after inoculation, being obscured by extensive fatty degeneration of the liver parenchyma. A marked toxic effect on the liver epithelium is not uncommon after intravenous injection, especially when the animal is overwhelmed by the infection.

Microscopical sections of the mottled livers showed that the foci consisted of small circular areas of reticulum with fairly large [illegible] scattered through its mesh [illegible] ritus were present in each [illegible] at the margins, with occasional polymorphonuclears and lymphocytes and the remnants of degenerate liver epithelium. Stained by the Jensen-Claudius Gram method the foci, even under low power, were outlined by darkly stained clusters of listeria. Single organisms and packets of twos and threes were also present, some phagocytosed by Kupffer cells and others extracellular, suggesting that the foci were due to aggregations of bacilli impacted in the liver sinusoids. The appearances in the liver were identical with those encountered often over a period of years in intravenous inoculations of rabbits with numerous strains of *List. monocytogenes*.

The spleens of the rabbits were moderately enlarged and contained similar foci, though smaller and less numerous. They were most often found at the margins of the malpighian bodies and in gram-stained sections were demarcated by the dark bacterial clusters at the edges. Phagocytosis of the bacilli by mononuclear cells was a conspicuous feature.

Naked-eye lung lesions were present in all, but were most marked in rabbit 41/60, which lived for 4 days after inoculation. Multiple greyish-white nodules up to 1 mm. in diameter were present in both lungs, from apices to [illegible] ubstance. The [illegible] ar in general [illegible], but with more [illegible] ome of which [illegible] aseation of the [illegible] giant-cell systems [illegible] be found sparsely [illegible] Langhans cell of [illegible] the margins of the [illegible] in one or two of the giant cells poorly staining, partly digested phagocytosed bacilli could be seen.

The astonishing similarity of these lung lesions to pulmonary tuberculosis, both in the gross and microscopically, we[illegible] Webb 1935). The group of [illegible] tionated the lipoids of the t[illegible], Sabin et al. 1925, *Sabin and Doan 1927, Sabin, Doan and Forkner* 1930) maintained that the mononuclear cell ("epitheliod" cell) reaction in the tissues of man and animals —the "tubercle"—is a specific response to the fatty acid, phthioic acid, which they isolated from the waxy envelope of *Mycobacterium tuberculosis*. Under appropriate conditions, *List. monocytogenes*—a non-waxy, non-acid-fast, rapidly growing gram-positive rod—can reproduce in the rabbit every feature of this tissue response.

In each of the three inoculated rabbits the organism was recovered after death from the heart's blood.

Two white mice were given intraperitoneal inoculations of the BCh-G strain.

Cultures were prepared as for the rabbit experiments. The mice were young adults, weighing about 20 g. Mouse 41/64 was injected with 300 million organisms and mouse 41/65 with 750 million organisms. The former died 70 hours and the latter 90 hours after injection.

The lesions in both mice were similar and resembled those in rabbits, with the exception of lung "tubercles" which were absent in the mice. The foci in the spleens were less prominent. This has been noted before and is due to a more generalised and less focal mononuclear cell reaction. The organism was recovered from the heart's blood in both mice.

Two mice were also inoculated with the listeria strain 58-XXIII (original rodent). Both died within 72 hours and the post-mortem lesions were identical with those of the BCh-G strain experiments.

Rabbit conjunctivitis test.—The ocular reaction first reported by Anton (1931) was tried in three rabbits.

[illegible] ton-wool swab was [illegible] of strain BCh-G [illegible] ed gently over the [illegible], with rabbit 41/72 the application was made twice, but in both experiments the result was negative. The third rabbit, 41/77, was given two conjunctival swabbings with the concentrated, centrifuged deposit from a 100 c.cm. broth culture flask in which the number of organisms was 50,000 million per c.cm.

With this [illegible] s appeared in 24 hours. [illegible] d together with a thick [illegible] inner canthus. Films from this showed numbers of mononuclear cells and a few polymorphonuclears and both phagocytosed and extracellular listeria. After 48 hours the cornea became involved, with cloudy infiltration and vascularisation, and the inflammatory reaction appeared to be at its height. It was subsiding at 72 hours and at 96 hours had almost disappeared. Within the next day or two no trace of the condition could be found, nor was there any residual scarring. The rabbit showed few constitutional symptoms and retained its appetite throughout.

Morris and Julianelle (1936), Julianelle and Pons (1939) and Julianelle (1940) confirmed Anton's results and extended the eye test to include twenty-two listeria strains, all of which gave positive results, and numerous control organisms, including ten strains of Erysipelothrix, none of which produced a conjunctivitis. These observers suggested that the eye reaction provides an even more [illegible] the [illegible] ue, [illegible] of [illegible] and erysipelothrix found that other organisms than listeria can stimulate the monocytes.

The cumulative evidence of the three biological tests, together with its cultural and serological reactions, *leaves no doubt that the BCh-G organism is a true strain of List. monocytogenes.*

LISTERIA AGGLUTININS IN THE PATIENT'S SERUM

The patient's serum was available for test against listeria suspensions on two occasions—namely, from vein blood samples taken 37 days and 12 months after onset.

[illegible] tile 23° C. gl[illegible] nt) which ha[illegible] a concentra[illegible] C. water-bath the results were read at 1 hour, 4 hours and 24 hours. The titre noted is the final dilution, after addition of the suspension. The test strains were 58-XXIII and BCh.-G.

Both serum specimens gave faint agglutination in a *dilution of 1/25, a titre which is not significant.*

NATURAL INFECTION IN ANIMALS

List. monocytogenes was first isolated (Murray, Webb and Swann 1926) from guineapigs and rabbits during an epizoötic among laboratory breeding stocks at Cambridge [illegible], both natural and experi[illegible] mong them multiple small [illegible] an increase in the number [illegible] the two most conspicuous features. Because of this constant monocytosis the name first given to the organism was "*Bacterium monocytogenes.*"

Harvey Pirie (1927), during plague survey studies on rodents of the South African veld, recovered the same organism from a gerbille in 1925, the animal being picked up near *Tiger River station in Orange Free State*. He proposed a new generic name, "Listerella," in honour of Lord Lister, and the species name, "*hepatolytica*," to indicate the liver-cell necrosis. When apprised of the prior claim of the Cambridge workers, he suggested *Listeria, in preference to Bacterium (monocytogenes)*, since the genus bacterium was being reserved for gram-negative aerobic rods. Pirie carried out experimental inoculations in several animal species, and, finding dogs, cats and monkeys resistant to infecti[illegible] the new [illegible] n and to [illegible] rrows in [illegible] minator [illegible] colonies. [illegible] in his attempt.

These remained the sole examples of animal infection due to listeria until 1930, when simultaneously in New Zealand (Gill 1931, 1933, 1937) and New Jersey, USA (Ten Broeck recorded by Seastone 1935) a meningo-encephalitis of sheep was found to be due to this organism. Because the affected animals showed a tendency to walk in circles with the head retracted to one side the condition was known by the local name of "circling disease." Increasing dullness and somnolence, with death in coma, was the usual outcome of an attack. Listeria was recovered in pure culture from the brain-stem and the condition was reproduced in normal sheep by experimental inoculation.

Jones and Little (1934) studied from 1930 onwards cases of serious disease among New Jersey cows, with the symptoms and signs of encephalitis, and in many of the fatal cases they recovered listeria without difficulty from the brain substance. The condition was readily reproduced experimentally with the cultures so isolated.

Since those first reports, Listeria meningo-encephalitis and encephalo-myelitis in sheep and cattle, and in goats and swine as well, have been recorded from numerous places in the United States, from Russia and from Germany.

Abortion in cattle (United States) and in sheep (England), with recovery of listeria from the organs of the aborted fœtuses, has occurred in two small epizoötics. In these cases the organism, though present in the placenta, had made no further invasion of the maternal tissues and the aborting animals suffered no sequelæ.

Listeriosis of fowls produces the same focal liver necrosis as seen in rodents and in addition massive necrosis of the myocardium. Extensive outbreaks with a high mortality have been observed in the United States and in England.

A distemper-like disease of foxes, occurring on a silver fox-fur farm in Illinois, was likewise proved to be due to listeria.

The organism is obviously widely distributed in nature, capable of attacking many animal species, and protean in the type of disease which it produces. Among animal reservoirs in which it is maintained ruminants must be of first importance. It is a curious fact that only once since 1924–25 has rodent listeriosis been recorded. This was in a single pregnant rabbit at Cambridge, on the exact site of the original rabbit and guineapig epizootic of 16 years before (Paterson 1940b). No listeria infection in rats has yet been described, though the plague-prevention services of many countries provide much post-mortem material from the rat population.

INFECTION IN MAN

Listeria meningitis and meningo-encephalitis in man—analogous to the infection of sheep and cattle—was first observed in Connecticut, USA, in 1933 by Burn (1934).

The organism was isolated from the blood of a day-old infant, dying after a short illness in which cyanosis, dyspnœa and drowsiness were the main features. At autopsy, focal necroses in the liver were found and the organism was recovered in pure culture from the heart's blood (brain examination was not permitted).

Schultz, Terry, Brice and Gebhardt (1934) observed the second case in California in 1933. This was in a nurse aged 44, and, although the meningo-encephalitis ran a severe course with a residuum of permanent speech and motor-defect, the patient recovered. Listeria was isolated from the cerebrospinal fluid on twelve separate occasions.

Burn reported two further cases in infants, and a fourth case in a man of 53, in 1934, all in Connecticut. Each was fatal and the organism was recovered from the brain, blood and viscera. His strains, together with that of Schultz and his colleagues, were inoculated into rabbits, guineapigs, mice and monkeys (Burn 1935) and the lesions produced included focal necrosis of the liver and meningeal exudates with mononuclear cell reaction. Listeria was recovered again from the inoculated animals, though with greater ease from the viscera than from the heart's blood.

To these five cases, starting in 1933, there have been added to date nine more, making fourteen in all. Eight of the fourteen were fatal. The age-incidence ranged from one day to 67 years. Eleven were males, three females. The countries of origin were, United States (both eastern and western seaboards and the middle west), Scotland, Uruguay and the Argentine. The first case in Great Britain (Gibson 1935) was published as an unusual type of diphtheroid bacillus meningitis (fatal) in an Edinburgh labourer. We subsequently obtained this culture from Gibson and showed that it was listeria (Webb and Barber 1937). Only two cases have thus been reported from the British Isles, both from Scotland. The second (Wright and MacGregor 1939) was likewise fatal, a meningitis in a male infant aged 17 months, in Stirlingshire.

In none of the fourteen cases was it possible to trace the infection to an animal source. It is indeed remarkable that in the 16 years since listeria was first described no-one has isolated it from a normal animal or human (with the possible exception of one positive fæcal culture from a normal fowl in Cambridgeshire)—that is to say, the carrier state has not been demonstrated. And this in spite of the world-wide distribution of cases of the disease.

In addition to the fourteen proven cases, listeria meningitis in man is suggested in reports long before Burn described his first case (1934). Atkinson (1917), for example, observed a small outbreak of meningitis in children in Perth, Australia, in 1915. The description of the organism isolated from the cerebrospinal fluid is very like listeria, though proof is lacking as the cultures were not preserved. Dumont and Cotoni (1921), however, who isolated a gram-positive rod from a fatal case of meningitis in an Italian soldier in the Champagne country of France in 1918, maintained their organism by laboratory subculture, and it was proved by Paterson (1940a) 22 years later to be a strain of true listeria.

These examples are not exhaustive. Listeria meningitis has undoubtedly occurred with some frequency in the past, sporadically and in small epidemics in man, in more extensive epizootics among animals, and its occurrence in the future in major epidemic, or even pandemic, form awaits only a favourable combination of circumstances. Fortunately the sulphonamide treatment promises success. The fatality-rate in the fourteen reported cases was 71%, but only two of them were so treated.

Wagner and Porter (personal communication 1938) in their Iowa case gave sulphanilamide in large doses and considered that the drug was responsible for the patient's rapid recovery. Savino (1940a, b, 1941) in the Argentine also had a dramatic cure with sulphapyridine therapy.

A previous report (Webb 1939) had been made on the use of sulphanilamide and sulphapyridine, combined with antiserum, in treating experimental listeriosis in mice; 350 mice were used and the drugs given by mouth in repeated doses, the antiserum by intraperitoneal inoculation. A 60% survival-rate after 100 lethal doses of listeria (rodent strain) was obtained with sulphanilamide alone; 90% survival with sulphapyridine. After 200 lethal doses the sulphanilamide survival-rate fell to 27%; the sulphapyridine to 73%; but on combining the latter drug with antiserum (rabbit) prepared against the strain used for inoculation the survival-rate rose to 100%; and even after 1000 lethal doses 90% of mice survived. This combination of sulphapyridine with specific listeria antiserum has yet to be tried in human cases.

RELATION TO INFECTIOUS MONONUCLEOSIS

The rôle of listeria in glandular fever, however, is still open to question. It has not yet been found in a sufficient number of cases to establish a strong claim as the cause—or at any rate the sole cause—of this disease. Other agents, too, dispute its claim.

Bland (1930, 1931) in London found a protozoon, *Toxoplasma*, in the spleens of rabbits injected with glandular-fever blood. As the animals showed a leucopenia with a relative mononucleosis he concluded that the protozoon might have been transferred in the injected blood and so be the causal agent both of the human and the experimental disease.

Van den Berghe and Liessens (1939a, b) and with Kovacs (1939) suggested a virus origin. These workers, in Belgium, injected glandular-fever blood into a monkey and produced a febrile disease with leucopenia, a relative monocytosis and a high Paul-Bunnell titre in the serum. The condition was transmissible through serial passage to other monkeys by the injection of Seitz-filtered blood, taken at the height of the fever.

Wising (1942) likewise suggests a virus origin. After injecting six normal medical students with lymph-node suspensions, three others with whole blood, and two more with filtered plasma, all obtained from glandular fever patients in Stockholm, he observed the development of the disease (typical clinical features and blood-picture) in one. In this subject whole blood, unfiltered, had been inoculated; the Paul-Bunnell reaction became positive to a titre of 1/32. No cultures from this experimental subject are recorded. Monkeys injected in a similar fashion gave, on the whole, negative results. Wising is against the view that *List. monocytogenes* can cause the disease. He failed to isolate any organism by blood-culture in twenty-one glandular fever patients (30 attempts), or by lymph-node culture in sixteen attempts (Friedländer's bacillus, staphylococci and "pseudo-diphtheria" organisms grew in three or four of these cultures). Injections of heat-killed listeria (two of Nyfeldt's glandular fever strains) intradermally in glandular-fever convalescents gave no striking skin reactions. And intravenous heat-killed listeria in normal subjects, though producing high agglutinin titres for *List. monocytogenes*, failed to raise appreciably the Paul-Bunnell titres of those individuals. Wising makes, however, the remarkable statement that his inoculation of the Nyfeldt listeria strains into rabbits in lethal doses produced no lymph-node enlargement, no significant monocytosis and no macroscopic lesions in any of the internal organs!

The suggestion that listeria might be the cause of glandular fever came from Aage Nyfeldt, Copenhagen, and was made soon after publication of the Cambridge paper describing the organism and its effects in rabbits. He was struck with the similarity in blood-pictures and began to take systematic blood-cultures from such cases as came his way. In March, 1929, he first reported (Nyfeldt 1929, 1932) the successful isolation of *Bacterium monocytogenes* ("*hominis*") from the blood of a typical case of infectious mononucleosis in the Blegsdam Hospital, Copenhagen. Two months later he obtained his second positive blood-culture, and this was followed in March, 1930, by a third. The three cases, all from the Copenhagen district, were described as having typical clinical histories, enlarged cervical lymph-glands and raised temperatures, and each showed a great increase in the mononuclear cells of the circulating blood (the paper of Paul and Bunnell was not published until 1932, so the

disease. In November and December, 1937, four further cases of glandular fever provided additional positive

eldt 1938).

ıg females,

-encephalitis though all four recovered. Listeria was isolated from the cerebrospinal fluid in each case and from the blood as well in two of them. Paul-Bunnell agglutination was positive with significant titres (1/64 to 1/512). Nyfeldt subsequently obtained three more strains of listeria from glandular fever cases in Denmark, and when he visited England in 1938 he submitted his ten strains to test. They cross-agglutinated with the strains in my collection, and Paterson (1939, 1940a) in Cambridge found them to constitute a distinct antigenic group possessing flagellar antigens A and B and somatic antigens II (III), IV, of which the last was unique among listeria strains.

No confirmation of Nyfeldt's results was forthcoming

st case. Then, in 1939, Pons

orted the recovery of *List.*

blood of a girl in New Jersey, USA, with typical glandular fever.

The patient had a raised temperature, a sore throat, enlarged cervical and axillary lymph-glands and a palpable spleen, but showed neither meningeal nor cerebral symptoms. The white cells rose to 17,700 per c.mm., with 88% mononuclears (lymphocytes and monocytes in equal numbers). A single Paul-Bunnell test was positive to a titre of 1/128. The blood-culture, taken on the 9th day, gave a profuse pure growth of listeria colonies on plating out after four days' incubation at 37° C. Animal inoculations with the strain produced death with the classical listeria lesions, the rabbit eye-test gave a severe conjunctivitis, and when the organism was studied in Paterson's series it was found to contain

in origin, was antigenically identical with the original Cambridge rodent strains isolated 13 years before.

My case in England in 1941 furnishes the third instance—in yet another country—of the association of *List. monocytogenes* and infectious mononucleosis.

Agglutinins against listeria have been sought for in glandular fever blood on numerous occasions.

In Nyfeldt's first case the patient's serum agglutinated the homologous listeria strain to a titre of 1/250. The patient had then been afebrile for five days. Julianelle (1940) tested thirty-five "typical" glandular fever sera against two listeria strains, one of rodent, one of ruminant origin. Agglutination was not very marked, the titres varying from 1/20 to 1/160. Janeway and Dammin (1941) found very moderate grades of agglutination (titres from 0 to 1/40) when thirteen glandular fever sera were set up against two listeria strains of human meningitis origin. Fifteen sera from patients with miscellaneous disease gave titres from 0 to 1/80.

My own findings in nine consecutive cases with typical blood-pictures and positive Paul-Bunnell reactions at 1/256 or higher were variable.

The first (25th day of disease) was negative (less than 1/25), the second (21st day) positive at 1/125; the third (11th day) negative; the fourth (14th day) positive at 1/250; the fifth (30th day) positive at 1/500; the sixth (11th day) negative; the seventh (7th day) negative, but positive at 1/125 on the 18th day; the eighth (12th day) positive at 1/125; and titre unchanged on 19th day; and the last (12th day) positive at 1/125. A third of the total gave negative results from single tests, but the change from negative to positive in the seventh case after an interval of 11 days is significant. In testing twenty-five sera from routine Wassermann blood samples I found all to be negative, but in forty-nine from hospital patients with various diseases there was positive listeria agglutination in thirteen. A titre of 1/25 was observed with six sera, 1/50 with five, 1/100 with one, 1/125 with two. In all these tests both rodent and human strains were used as antigens.

Until something more is known about the carrier incidence in the general population, listeria agglutinins in miscellaneous blood samples remain unexplained. The absence of these agglutinins in any appreciable quantity in the blood of some glandular fever patients, however, is certainly evidence against listeria as the cause of the disease in those cases. But to be fairly assessed it is clear that each case should be established as unequivocal glandular fever—using all known criteria—and repeated agglutination tests should be done throughout the febrile stage of the disease and well into convalescence.

High-titre listeria agglutinins in rabbits can be produced at will by injections of listeria cultures, living or dead, though inoculation of man with vaccines has not been tried on a large scale. It has been argued that, if listeria is the cause of infectious mononucleosis in man, then rabbit injections ought to be followed by the formation of heterophile sheep red-cell

out this hypothesis.

ntravenous injections

ell tests were negative.

This constituted, in his view, evidence of some weight against the organism as the ætiological agent. The evidence is adverse, but it would be weightier if undoubted cases of infectious mononucleosis were not known to occur in which negative Paul-Bunnell reactions are found throughout the course of the infection.

The search for listeria ought to include systematic cultures of the enlarged superficial lymph-glands, especially in the early stages of an epidemic of infectious mononucleosis. Baldridge, Rohner and Hansmann (1926) carried this out in six cases among Iowa university students and recovered from four a short gram-positive rod. It was considered to be a diphtheroid, possibly a contaminant, and was not further identified (the description of *List. monocytogenes* only appeared in that same year). I have recently cultured two axillary lymph-nodes from undoubted cases, nodes sent in from ward biopsies, but a heavy growth of contaminating organisms spoiled the cultures.

In a few cases trial of sternal bone-marrow cultures has proved no more successful than vein blood. Where vein blood-culture has given a negative result, animal inoculation with 3 c.cm. of whole blood has not, in the few attempts made, produced listeria infection.

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cases, especially of early epidemic cases, appear to offer the most promising chance of success.

SUMMARY

1. *Listeria monocytogenes* was isolated by blood-culture from a typical case of glandular fever in eastern England in 1941. This is the third observation of its kind: in the two previous instances the countries of origin were Denmark and the eastern United States of America.

2. The cultural and biological tests for this organism, including the appearance of the lesions in experimental animals, are given.

3. The natural history of disease in animals caused by listeria ("listeriosis"), and the relation of listeria to certain types of human meningitis and meningo-encephalitis and to infectious mononucleosis, is discussed.

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VITAMIN A AND DARK ADAPTATION

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DURING a study of the complete dark-adaptation curves in about 400 apparently normal people, several points of interest emerged relating to the course of dark-adaptation and the effect upon it of vitamin A. Some of these have a bearing on the general problem of dark-adaptation.

TECHNIQUE

The course of dark-adaptation was measured by the apparatus described by Haines (1938 ; see also Yudkin 1941). The instrument has been modified somewhat from the original one as supplied by Messrs. Crookes.

The subject is told to look along a tube 14 in. long, whitened on the inside, which can be illuminated by a bright lamp for the preliminary bright-adaptation. The 60 watt lamp in the original instrument was replaced by one of 75 watts ; the bright-adapting light is then of the order of 500 millilamberts. The test objects are arrows subtending an angle of 6° at the eye, cut out of a plate at the further end of the tube. The plate may be rotated by the observer so that it presents either a blank white surface (for bright-adaptation) or one of four arrows pointing in one of four different directions (for dark-adaptation). The intensity of the test light, which illuminates the arrows from behind, can be controlled by a combination of neutral filters and a pair of polaroid discs, one of which can be rotated, thus reducing by a desired amount the intensity of the transmitted light. The neutral filters, of which there are three with transmissions of about 1/10, 1/100 and 1/1000, are fixed on a rotating wheel with four apertures. Thus, by using the polaroid discs alone or in combination with one of the three filters, the illumination may be varied continuously over the range from about 10^7 down to 10^3 or less micro-micro-lamberts (i.e., from 7 to 3 log. $\mu\mu$l).

The test is conducted in the following way. The bright adapting light is switched on and the subject is instructed to rest his head against the end of the tube and look along it. He is told to keep moving his eyes about so that as large an area of the retina as possible is adapted to the bright light. After e[illegible]ly 7 minutes, the bright light is replaced by the test light, [illegible] plate carrying the arrows is rotated so that one is in [illegible] the polaroid disc has previously been set at the position of maximum transmission and the wheel carrying the neutral filters arranged so that no filter is in the path of the test light. In other words, the arrow is illuminated by the maximum amount of light. As soon as the subject sees the arrow—after about 20 or 30 seconds—the time is noted and the polaroid disc is rotated to decrease the illumination by about 0·1 or 0·2 log unit. Again the time is noted when the arrow is seen and again the illumination is reduced. The procedure is repeated until 30–40 minutes have elapsed, when dark-adaptation is usually complete. The polaroid disc is never rotated more than will reduce the transmission to 10%, since after this the colour value of the transmitted light begins to alter ; the next reduction in illumination below 10% is brought about by putting in the next lower neutral filter and turning the polaroid disc back to the position of maximum transmission. After the initial rapid adaptation during the first minute, the reliability of the subject's answers may be checked by asking him to state the direction of the arrow, which is rotated at intervals. The subject is encouraged, especially after the first few minutes of dark-adaptation, to allow his eyes to move about and so to find the position of maximum sensitivity of his own retinæ. We have never encountered any difficulty in getting the subject to do this, and he quickly learns to look in the direction which enables him to see the arrow best. After 15–20 minutes, when the progress of the adaptation is slow, the subject is asked to close his eyes, and lean back in his chair for a minute or two at a time, and thus only to look along the tube at intervals. This considerably relieves the strain, which is accentuated towards the end of the test by the fact that it may take 10 minutes or more to see the next lower illumination. After 30 minutes of adaptation, the threshold is usually determined by a procedure which is the reverse of that used in the earlier part of the test—the minimum detectable illumination is determined by increasing the light until the arrow is just seen and then slowly reducing it until it disappears. This is repeated once or twice at about 30 minutes, again at [illegible] 35 minutes [illegible] lastly at about 40 minutes.

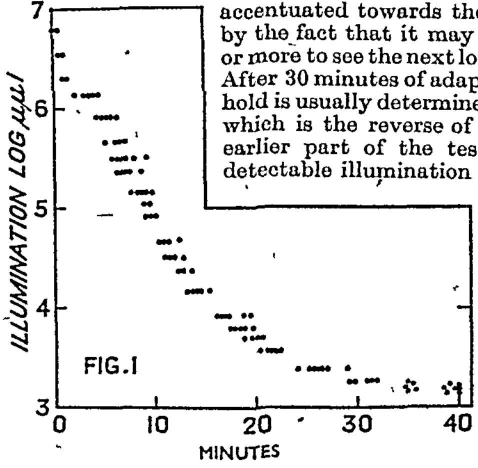

Fig. 1—Reproducibility of dark-adaptation curves. One subject tested eight times.

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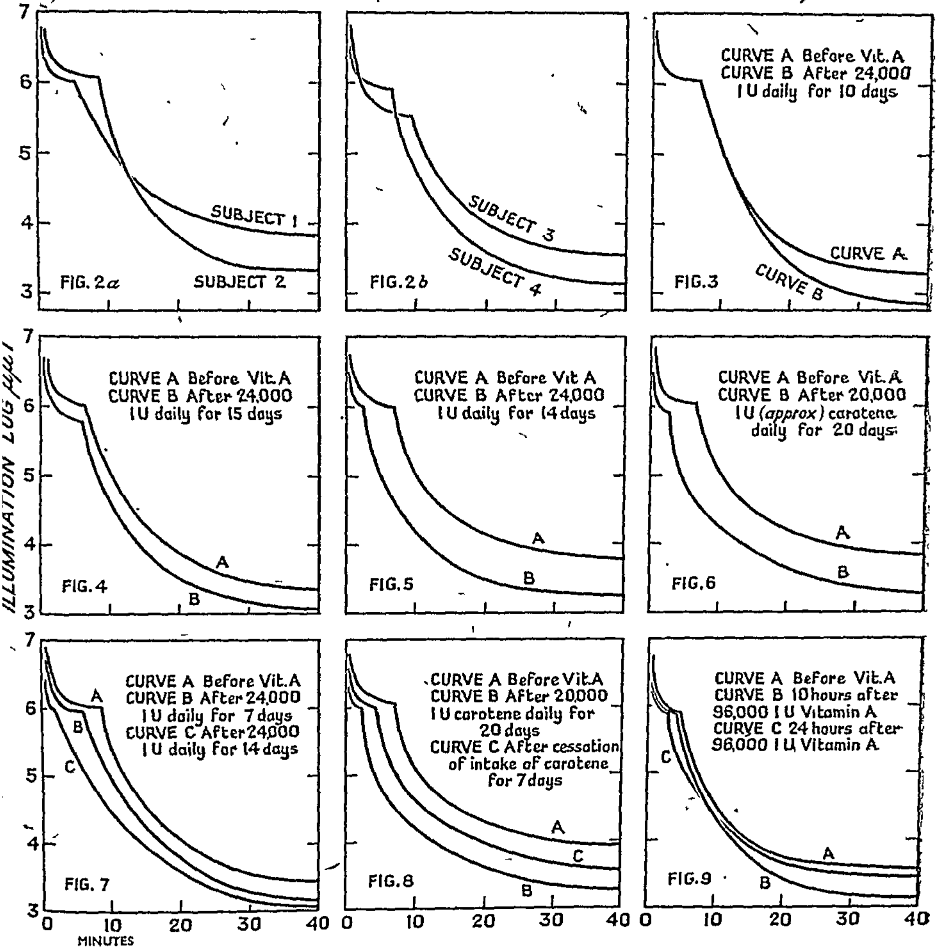
* Sir Halley Stewart Research Fellow.

CURVES OF DARK-ADAPTATION



Figs. 2a and 2b—Individual differences in curves of dark-adaptation.
Fig. 3—Change in rod threshold only.
Fig. 4—Change in cone threshold and rod threshold.
Fig. 5—Change in rod threshold and transition time.
Fig. 6—Change in cone threshold, rod threshold and transition time.
Fig. 7—Gradual improvement with continued administration of vitamin A.
Fig. 8—Improvement after administration of carotene ; relapse after cessation.
Fig. 9—Transitory changes produced by one large dose of vitamin A.

Figs. 3-9 illustrate various effects of vitamin A on dark-adaptation.

RESULTS

Altogether we have measured the complete course of lark-adaptation of about 400 subjects. The results eported here have been selected as illustrating certain oints of interest. About 40 subjects, mainly research vorkers and laboratory technicians, have been studied epeatedly, and it is with these subjects that the effects
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assess the powers of different
dark by methods which will avoid the necessity for determining the whole course of adaptation. In many of these methods instruments and
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is rapid is also one whose final
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the final rod threshold can be gauged by a knowledge of the initial rate of adaptation. A study of the complete

course of dark-adaptation, however, shows clearly that this assumption is unwarranted (see also Craik and Vernon 1942, Dow and Steven 1941). Many examples are found where the initial rate of adaptation is rapid but the final threshold quite low. Thus dark-adaptation curves of two or more subjects plotted on one chart often cross, as is shown in figs. 2a and 2b. Such crossing may take place even up to 20 minutes of dark-adaptation. The grading of subjects in order of performance in dark-adaptation after exposure to bright light will therefore vary with the length of time that they have been dark-adapted, and will only remain the same if the time is more than about 20 minutes.

The grading of performance may be especially erroneous if the visual threshold is measured, as in some instruments, after 5–10 minutes in the dark; that is, at a time when the transition between rod and cone vision has occurred or is about to occur. An illustration of this is seen in fig. 2a. Subject 1, with poor dark-adaptation as measured by the final rod threshold, has an early rod-cone transition time. Thus, at 8 minutes, he can see a light of much lower intensity (1 log unit or 1/10) compared with subject 2, although the final rod threshold is much lower in the latter.

These considerations are clearly important, and failure to recognise them has often led to error and misconception in the collation and interpretation of data on dark-adaptation. The best single criterion of dark-adaptation, especially for the detection of vitamin-A deficiency, is the final rod threshold, since, as we shall see later, the administration of the vitamin, if it affects the dark-adaptation at all, will invariably lower the final rod threshold while it may or may not affect other parts of the curve.

Effect of vitamin A.—The most intensive study of the effect of therapy on dark-adaptation has been made on 14 laboratory research workers and technicians who were given either vitamin A (24,000 IU daily) or carotene (20,000 IU daily in the form of carrots) for several weeks. All the results quoted below have however also been seen in other subjects studied less intensively. Dark-adaptation was measured at least twice before the administration of the vitamin or provitamin and was repeated at intervals during the administration; when measurements were made during the period of administration of the vitamin, the treatment was usually stopped for 24 or 26 hours before the test was performed, so that we were not dealing with the possible transient effects of the vitamin (see Yudkin 1941, and below).

The general results have been as follows. Subjects receiving neither vitamin A nor carotene showed no significant change in any part of the curve. About half of the treated subjects similarly showed no significant change. In those in whom significant improvement followed treatment,† there was invariably a lowering of the final rod threshold. Other parts of the curve showed various differences in the manner and extent of the changes. Considering the three features of a dark-adaptation curve—the final cone threshold, the cone-red transition time, and the final rod threshold—and allowing for the fact that the final rod threshold is always one of the features affected by vitamin A, then the four possible variations in the changes which may occur with vitamin A are:

1. Alteration in final rod threshold only.
2. Alteration in final rod threshold and final cone threshold.
3. Alteration in final rod threshold and cone-rod transition time.
4. Alteration in final rod threshold, final cone threshold and cone-rod transition time.

Each one of these types has been observed among our subjects, and representative curves are shown in figs. 3, 4, 5 and 6. The alteration in the cone-rod transition time was often considerable; in one case, it was reduced from 6½ to 2½ minutes; in another, from 9 to 1½ minutes.

So far, we have described only the final changes induced by treatment lasting usually 4–8 weeks. Curves determined at intermediate intervals during this time frequently showed changes intermediate in degree (fig. 7). In one case, the administration of carrots was stopped after 10 days; 7 days later, the subject's ability to adapt had deteriorated tow[illegible] low level (fig. 8).

By measuring the [illegible] another series of subjects at short intervals after a single large dose of the vitamin, some were found who showed improvement in the final rod threshold during the 24 hours after the dose (see also Yudkin 1941). Occasionally, there were indications that the final rod threshold was the part of the curve which changed earliest, and that cone threshold and/or cone-rod transition time improved later. In a few cases, the final rod threshold had partially returned to its previous value by the time the other changes were seen (fig. 9).

DISCUSSION

Considerable differences of opinion have been expressed concerning the technique of measuring dark-adaptation. Discussion has centred especially round the advisability of having a fixation spot, of showing the test light in flashes and of using a form-perception test rather than one of simple light perception. In our opinion many of the differences have been considered too much from the theoretical aspect; too few comparative tests have been done with different apparatus to determine whether and to what extent differences in technique produce different results. Various types of apparatus measure somewhat different functions, and the purpose of any particular investigation should determine the type of apparatus used. Thus, the presence of a fixation spot will be of special value in determining the physiological status of a fairly definite area of the retina; the absence of a fixation spot on the other hand allows the subject to find the most suitable parts of the retina with which to view the object and so to approach the practical conditions of vision at night.

In nutritional work, measurements of dark-adaptation are utilised to detect deficiency of vitamin A. For this purpose, the two requirements of a satisfactory apparatus are that it should give results which, in an untreated subject, are reproducible within fairly narrow limits, and that it should show changes resulting from vitamin-A deficiency. This second point may be demonstrated either by deterioration induced by deprivation of the vitamin or by improvement following treatment with vitamin A. We consider that the results reported here on reproducibility and on changes following administration of vitamin A show that the technique and apparatus we have used meet the requirements for a method suitable for detecting deficiency of vitamin A. Results obtained with the apparatus in nutritional survey work will be recorded in a later paper.

We have already stressed that the determination of dark-adaptation without a fixation spot gives a better idea of the subject's ability to see at low illuminations. Let us then consider our results as they might apply to people going from conditions of high illumination, such as a brightly lit room, into conditions of low illumination, such as a clear star-lit night. It will be evident that individual differences in the course of dark-adaptation will here be of considerable practical importance. After a period of high illumination, two people after a short interval in the dark may have differences in light perception amounting to 10 times (see fig. 2b). These differences, of course, will only be seen if the subjects' cone-rod transition times differ widely. Similarly, the differences will become much less later, after the transition has occurred in both individuals. But until that happens, the differences will be important, especially when it is remembered that the range of variation in the final rod threshold—i.e., the fully adapted eye—in the general population is also of the order of 1 log unit or 10 times (see Robertson and Yudkin 1943).

In effect, these findings mean that the relative ability of people to "see in the dark" may be very different after a short time in the dark from what it is after a longer period. This may account for some of the discrepancies often found between the statement of a person concerning his night vision and his performance as shown by measurement of the sensitivity of his fully adapted eyes. If he is accustomed to spending only a short time in the dark he may well see better than his neighbour, although his adaptation as measured by the final rod threshold may be no better or indeed worse than his neighbour's.

The proportion showing improvement was surprisingly high. In view of the small number of subjects studied, this may have been coincidental but further study is warranted.

The differences in the effects produced by vitamin A in different people has similar significance. For those engaged in outdoor night work over long periods, such as on sentry duty, the value of the final rod threshold is probably of most importance. But for those who have frequently to leave brightly-lit surroundings to spend short periods in the dark, the speed with which adaptation occurs may be more important. In particular, a shift in the cone-rod transition time of two or three minutes may make a difference of 10-fold or more in their ability to perceive minimal illumination after a short while in the dark.

The fact that administration of vitamin A may or may not affect parts of the dark-adaptation curve other than the final rod threshold is also of practical importance from the point of view of diagnosing deficiency of vitamin A. Very different interpretations of the effect of dosing with vitamin A may sometimes be made if single measurements are recorded at different intervals during the course of the adaptation. Thus, measurement of dark-adaptation in the first 12 minutes (see fig. 3) may not reveal the improvement produced by the vitamin. The conflicting reports on the effect of vitamin A may possibly be due to such causes. Our results indicate that if a reading is to be taken at only one point in the curve to ascertain whether the vitamin has altered dark-adaptation, this point should be after complete, or nearly complete, adaptation—i.e., as near as practicable to the final rod threshold.

Let us now consider the theoretical aspects of the changes induced in the course of adaptation by vitamin A. We have stressed the fact that treatment with the vitamin may or may not change the cone-rod transition time. Hecht and Mandelbaum (1939) have also commented on similar differences found in different types of deficiency and conclude that "simple dietary avitaminosis does not change the time of the cone-rod transition period, whereas severe cirrhosis of the liver delays its appearance to almost twice the time, even though the final thresholds may be affected to the same extent in the two instances" (see [illegible] al [illegible] 1938). They conclude that [illegible] time points to disturbance [illegible] vitamin. Superficially, our results appear to contradict those of the American workers. All our subjects who responded to vitamin A may presumably be classed as

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SUMMARY

Using a modification of the Crookes dark adaptation apparatus, we have measured the course of dark-adaptation in some 400 apparently normal subjects.

Repeated measurements showed that the readings for one subject are reproducible within narrow limits. In [illegible] rarely exceed 0·2 log [illegible] minutes for the cone- [illegible]

[illegible] ries considerably in [illegible] threshold in the early [illegible] the first 10 minutes—may bear no relation to the readings of the final rod threshold. This confirms the observations of other [illegible] many workers still use methods [illegible] a few minutes or even seconds [illegible] ation, the importance of these observations is stressed.

Administration of vitamin A, if it affects dark-adaptation at all, always affects the final rod threshold. Other parts of the curve, such as the cone threshold or the cone-rod transition time, may not be affected.

If single readings are to be used for assessing visual performance in the dark they are best made in conditions approaching complete adaptation.

We are indebted to Dr. K. J. W. Craik for much helpful discussion throughout this work and to Dr. L. J. Harris for his interest and advice. Our thanks are also due to Messrs Glaxo, Ltd., for supplies of vitamin A.

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LUNG STONE CAUSING PROFUSE AND RECURRENT HÆMOPTYSIS

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IN July, 1931, a doctor asked me to see a woman, aged 35, because of profuse hæmoptysis. The history was one of recurrent hæmorrhages from the lung since the age of 11. At that age she was reputed to have had pneumonia on the right side, and ever since she had been troubled by a cough every day of her life, and at intervals by the hæmorrhages already mentioned. The hæmorrhages were preceded by a pain in the lower part of the right chest. These occurred once or twice a year, but as she grew older they became more frequent and severe, and were liable to come on after exertion. She was married at the age of 25, after which there was no further bleeding from the lungs for five years, but the cough continued the whole time. At the age of 30 she had another hæmoptysis after cranking a car, and afterwards the hæmoptyses became worse with exercise and continued at approximately yearly intervals.

There had been no loss of weight, and she felt perfectly well apart from the distress caused by the hæmoptyses. On examination there was dullness over the right lower lobe, and râles were present. She had been examined and X rayed before. No satisfactory explanation of the recurrent hæmoptyses was forthcoming. I made a diagnosis of bronchiectasis, in which I felt considerable confidence, and the relatives of the patient were much gratified that at last someone had really got to the root of the trouble. The advice I gave was that when the [illegible] tely ceased the bronchial tr[illegible] by lipiodol. Five days later th[illegible], had a paroxysm of coughing, and coughed up an irregular, hard, jagged object 0·75 by 0·5 cm. in size, apparently a lung stone. Immediately after this there was a profuse hæmorrhage. Her doctor reported the right base solid, but this soon began to clear. For three or four days the patient brought up a considerable quantity of blood. Then it gradually ceased. After this the cough, which had been with her daily for twenty years, ceased and did not recur, and there was no more hæmorrhage. In spite of this I thought that bronchiectasis probably existed and that a lipiodol investigation was highly desirable. This was carried out in the September. No dilatation of the bronchi was seen, proving that the hæmorrhage was not due to bronchiectasis; from the previous and subsequent history it was almost certainly caused by the lung stone, which was presumably half in and half out of the bronchus, causing both the hæmorrhages and the persistent cough.

In 1934 she had one slight hæmorrhage. In November, 1939, I saw her again. She had been remarkably well but on three occasions, after heavy exertion, had brought up less than a teaspoonful of blood. Since June 1939, however, she had had a recurrence of pain at the right base which might be acute for a minute or two or an hour. She described it as like the old hæmorrhage pain. On this occasion she looked well with no loss of weight, no cough, no sputum, and no hæmorrhage for two years. There were no abnormal physical signs in the chest, no clubbing of the fingers, and the blood-pressure was normal. In 1940 she contracted pneumonia on the left side. This was followed by an empyema which was successfully drained. The patient made an excellent recovery, she is well today, and there have been no more hæmorrhages. While in hospital for the drainage of the empyema she had a coughing and vomiting attack and brought up a stone, similar to the previous one, but smaller.

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* Dr. Chandler died on Oct. 8, 1942. This article was among his papers.

COLLAPSE UNDER PENTOTHAL SODIUM ANÆSTHESIA

F. Hoenigsberger, L R C P, D A
ANÆSTHETIST TO THE SCOTTISH EMS

In Hunter's[1] summary of the dangers of 'Pentothal Sodium' anæsthesia there is a reference to experimental work showing that cardiac arrest may follow the injection of this drug into dogs. I feel that this must be a rare complication in man and I know of no cases of this kind having been recorded. Since I have used this drug for some years in a considerable number of cases, and met this complication for the first and only time about six months ago, I hope it may be of interest to record this case.

A miner, aged 40, of spare build, was admitted in the early hours of the morning with a compound fracture of the tibia and fibula and, in addition, a fracture of the neck of the femur, which were due to a mining accident. There was no great degree of shock. He had had morphine, gr. ¼, 3½ hours before operation, and hyoscine, gr. 1/150, was given 1½ hours before.

A smooth induction was obtained with 3 c.cm. of a 5% solution of pentothal sodium. After a short pause, a further 5 c.cm. of the same solution was injected more slowly and it was found that narcosis was still fairly light, the respiratory excursions being good. A further 4 c.cm. was injected slowly after a short interval, while the operation was being begun. At this stage, 10 minutes after the start of the injection, pallor appeared suddenly and respiration ceased abruptly. The pulse was found to be very weak, fast and irregular in time. Artificial respiration with pure oxygen by means of a rebreathing bag was started without delay and satisfactory chest expansion was obtained through an oral airway. The pupils were contracted at this stage. After 3 minutes there was no spontaneous attempt at respiration and the pulse became barely perceptible. An intravenous injection of 6 c.cm. of nikethamide was now given without apparent effect. Five minutes after the appearance of the first alarming signs, the pulse was quite imperceptible and no heart sounds were audible to auscultation. Pallor without cyanosis persisted and the pupils were now dilated.

At this stage 1 c.cm. of 1 : 1000 adrenaline was injected by the surgeon through the fourth left intercostal space, as near to the border of the sternum as possible. This produced no apparent effect except for a few generalised muscular twitchings. After an interval of one minute, a similar injection was given through the third left intercostal space, which, preceded by a few powerful generalised muscular contractions, was followed at once by reappearance of the radial pulse and heart sounds to auscultation (7 minutes after the first appearance of untoward signs). The pulse was irregular but quite strong and was accompanied by the appearance of a pink colour in the patient's face. Spontaneous respiration restarted at the same time, until which time effective artificial respiration had been continued without interruption. The operation was then resumed and completed in a further 40 minutes, during which time pure oxygen was administered continuously. There was no further cause for alarm.

Progress.—The pulse continued to be irregular but strong for the rest of the day, but settled satisfactorily in the evening. The patient regained consciousness 1½ hours after return to the ward, but slept for long periods during the day. I questioned him in the evening and he appeared perfectly rational, and throughout his stay in hospital showed no signs of any cerebral damage. Two days after operation he developed pericarditis and bilateral basal pleurisy and these conditions did not completely clear up until about three weeks later. In the meantime, he developed a dry gangrene of the leg which had been the site of the compound fracture. This leg was amputated above the knee 24 days after the first operation. On this occasion a unilateral subarachnoid leg-block was employed, accomplished by 110 mg. of a 10% solution of procaine, with a premedication of morphine, gr. 1/6, and hyoscine gr. 1/150, 1½ hours before operation. There was no appreciable fall of blood-pressure and the patient remained in an excellent condition throughout and after the operation. Dissection of the amputated leg revealed a thrombosis of the posterior tibial artery in its entire length.

On questioning, the patient gave a history of having "collapsed" under a previous anæsthetic, but he could give no particulars. Examination of the heart after his recovery was complete showed no abnormalities, but an electrocardiogram could not be taken. He is a spare man with a pale complexion, but he shows no signs of nervousness or excitability. He professes always to have been well and fit.

I wish to thank Dr. W. J. Richard and Mr. A. M. Clark for permission to publish this case.

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[1] Hunter, A. R. *Lancet*, 1943, i, 46.

Medical Societies

BRITISH ORTHOPÆDIC ASSOCIATION

The spring meeting of the association was held in Glasgow on May 14 and 15 under the presidency of Mr. G. R. Girdlestone.

INJURIES OF THE SPINAL CORD

Mr. R. C. Murray, in an analysis of 21 cases of spinal-cord injury admitted to the Killearn EMS Hospital, said that the neurological lesion can usually be accounted for by a study of the radiograms, but where these show no adequate cause there may be a protrusion of bone from the back of the vertebral body which is a possible indication for early laminectomy. In cord lesions with complete loss of function lasting 24 hours no recovery can be expected in segments below the lesion. The chance of recovery is best in cervical lesions and those below the first lumbar vertebra. There is no limit to the time of recovery of motor-fibres in the roots and cauda equina. Reduction should be carried out in all cases, for even in complete cord lesions this may lead to the recovery of some roots and so add two or even three useful segments. Reduction should be followed by fixation—in the cervical region by continuous skeletal traction, after operative reduction by a hyperextension plaster jacket, and in cauda lesions by a plaster bed and turning case. The greatest difficulty, on account of pressure sores, is in dorsal lesions, for which a complete combined plaster jacket and double spica is advisable, so as to distribute pressure evenly, facilitate turning and relieve pain and spasm. For treatment of the bladder, Mr. Murray recommended tidal drainage. Few cases should be regarded as hopeless, for even with a complete lesion at the level of the conus a patient may learn to walk.

Mr. Roland Barnes, reporting on a similar group of patients, stressed the importance of accurate sensory testing in assessing the degree and prognosis of the spinal-cord injury ; this is more valuable than knowledge of the extent of motor paralysis. The prognosis is worse in lesions at the level of the 12th thoracic than of the 1st lumbar vertebra. Laminectomy is never indicated as an immediate operation, but should be done when there is an incomplete paraplegia not showing spontaneous recovery, if there is evidence of increasing pressure on the cord, or for severe and intractable root pains. Reduction of vertebral displacement should always be attempted particularly if the paraplegia is incomplete. Radiograms of the highest quality are essential. Fracture-dislocations with locked facets are commoner than is generally realised. For this injury an open operation is required ; the excision of articular processes should be avoided so as to maintain the stability of reduction which usually should be further assured by internal fixation. For such operative cases Mr. Barnes prefers a plaster bed and turning case. For paralysed bladder he condemned manual expression or an indwelling catheter ; suprapubic cystotomy is indicated under field conditions, in irreparable spinal-cord injuries above the sacral segments, or where for any reason tidal drainage is impracticable.

PHOSPHATASE IN DISEASES OF BONE

Prof. NOAH MORRIS reviewed present knowledge of phosphatase, an enzyme which is widely distributed in the tissues and whose function is to accelerate the [illegible] f [illegible] -ase is pathognomonic of the presence of bone disorder. Of itself it is of little value in the differential diagnosis of osseous lesions, but taken in conjunction with clinical, radiological and other biochemical findings it is often of considerable assistance. Destruction of bone per se is not accompanied by any great increase of plasma [illegible] -nd tissue is being [illegible] -asma phosphatase [illegible] acceleration in rate [illegible] activity of osteo- [illegible] -eoblastic activity [illegible] -position of calcium salts. A reasonable hypothesis might be that, if ossification is not maintained at a rate sufficient to meet the degree of cellular activity on which phosphatase formation is dependent, excess of ferment passes over into the plasma. If this is correct one might expect an increase of plasma phosphatase as a result of (*a*) increase in bone-cell activity at such a rate that it could not be satisfied by the available calcium, or (*b*) insufficient intake of calcium or vitamin D or both. With Mr. Matthew White he had followed the course of the plasma phosphatase in a child with healed rickets during a period of calcium starvation and ammonium chloride administration. Here with the defective supply of calcium the plasma phosphatase showed a considerable rise. Woodard and his co-workers showed that with primary tumours plasma phosphatase increased only when the tumour cell [illegible] much quicker than [illegible] t plasma phosphatase [illegible] therapy is due to the [illegible] phosphatase-forming cells. In bone metastases the increase of plasma phosphatase appears to be due to a defence reaction manifest as increased bone formation adjacent to the tumour cells. Only when the reaction is osteoplastic does [illegible] increase; in osteolytic lesion [illegible] -served. In many pathological [illegible] -h as rickets, osteomalacia and Paget's disease, the variations of plasma phosphatase afford a valuable guide to the course of the disease, the prognosis and the effect of any therapeutic measure. Acid phosphatase is found in many tissues, but if an increase is found in the plasma it is almost invariably derived from prostatic glandular epithelium. Normally very little prostatic phosphatase appears in the plasma and it is abnormally high only when the blood and lymph vessels are invaded by tumour cells derived from the prostate. Serial determinations of plasma acid phosphatase seem to be of special value in assessing the results of castration or œstrogen therapy.

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In a paper on *The Control of Infection in Burns*, Dr. LEONARD COLEBROOK divided the infections into two categories—first, the coccal infections of the first week which are the most threatening to life and to rapid recovery but the control of which is well within sight; secondly, the bacillary infections occurring when sloughs are separating and largely responsible for the patient's anæmia and low state. The control of these may be [illegible] effective against them as penicillin is against the cocci. In 310 cases of burns admitted to the special unit of the Royal Infirmary, Glasgow, the methods used to obtain improved results included strict aseptic precautions during the first few hours following admission, with the use of sterilised blankets; an attempt to sterilise the burned surface with CTAB solution (without anæsthesia), the application of a bacteriostatic dressing which could be left undisturbed for 7–10 days (sulphanilamide or sulphathiazole, in lanette wax SX and castor oil base—10% for most cases, 3% for extensive burns); prompt elimination of hæmolytic streptococci from burns already infected, by means of penicillin or propamidine, and reduction of cross infection—e.g., strict "no-touch" dressing technique, masks, and elimination of dust.

Mr. JAMES PATRIC[illegible] *Pronation in Forearm* [illegible] of the forearm bones l[illegible] movement is only to l[illegible] head of the radius and in fractures lower down in either bone where the attachment of the interosseous membrane is involved by fibrosis, ossification or shortening. It is important to realise that the axis of radial rotation is exactly along the interosseous ridge of the ulna. He stressed the importance of lesions of the triangular fibrocartilage at the inferior radio-ulnar joint, not only in Colles fracture but also in fractures of the head of the radius, where early active rotation movements are advisable after the head has been excised. In fractures of the shafts of the radius and ulna operation should be avoided as far as possible; where necessary only the radius should be exposed and its interosseous aspect should not be encroached on. When cross union occurs in the lower third of the forearm, excision of a segment of the ulna including the fracture gives good results. For permanently severe loss of rotation after Colles fracture, excision of the lower inch and the articular portion of the ulna is also good. Late angulation of fractures of both forearm bones is due to wasting of the brachioradialis muscle which allows sagging of the fracture within the plaster case; adequate support in the middle of the forearm avoids this complication.

Mr. I. S. SMILLIE, in a paper on *Regeneration of the Menisci of the Knee-joint* in man, described the fibrous structure which partially replaces an excised meniscus. It is densely adherent to the synovial membrane at its periphery, it is thinner and narrower than the normal structure and is whiter because it is composed of fibrous tissue only. In five cases regenerated "cartilages" were torn, a circumstance which is rare unless factors producing gross instability are present within the joint.

Dr. G. W. ARMSTRONG, of the Canadian Orthopædic Unit, with a cinematograph film, described his method of internal fixation by screws in carefully selected cases of *Oblique Fractures of the Tibia*, demonstrating the importance of a precise technique with perfect equipment. Mr. ATHOL PARKES read a paper on *Traumatic Ischæmia of Peripheral Nerves* occurring in a group of patients in whom a severe injury to the leg, with or without fracture, had been followed by gross swelling [illegible] tension under the deep fascia due to extravasation of blood and tissue fluids, causing ischæmia of the nerve trunks by pressure. Early operation is required even when the peripheral pulse is present. Incisions through the deep fascia will relieve tension and prevent the [illegible] the work of the Hunters, of Lister and of Macewen.

EXTENSION OF [illegible] General Sir Alexander H[illegible] Medical Services, presided [illegible] when an extension of the funds to meet the needs of cases arising from the disablement or death of medical and dental officers serving during the present war was initiated. The funds were founded in 1916 for the benefit of widows, orphans or children of officers and men killed or severely disabled while serving with one of the auxiliary branches of the RAMC—namely, Special Reserve, Territorial or New Army. The extended funds grant financial help to officers of the auxiliary branches of the RAMC and the Army Dental Corps who become incapacitated, wholly or in part as a result of wounds, sickness or accident arising during service in the present war, and to their widows and children. The minimal subscription has been fixed at one guinea, and it is hoped that subscribe[illegible] will make their first subscriptions retrospective. Cheque[illegible] should be sent to the treasurer of the Auxiliary RAMC F[illegible] (1939), 11, Chandos Street, London, W.1.

Reviews of Books

Year Book of Eye, Ear, Nose, Throat, 1942

SAMUEL J. CROWE, MD; ELMER W. HAGENS, MD; LOUIS BOTHMAN, MD. (Year Book Publishers; Lewis. Pp. 640. 11*s.*)

THE field scanned in this book is roughly the year from the middle of 1941, and for only a part of this was the United States an active participator in the war; as a result about 90% of the references are to American literature. Neither of the specialties has much direct warlike contact, and it is natural therefore that where speculative inquiry has been exercised there is an immediate practical application to some problem provoked by the war. The importance of keen vision in mechanised warfare, both on the ground and in the air, coupled with nutritional difficulties, has resulted in a survey of the relationship of the vitamins to ophthalmology—an excellent special article referring to 99 papers. There are again a number of references to papers on the effects of noise on hearing. Perlman produces evidence showing that deafness is maximal an octave above the pitch of the noise of greatest intensity. Experimental work on cochlear potentials and action currents in single fibres of the auditory nerve confirms that spread is towards the high tone end of the organ of Corti as the intensity of the stimulating noise increases. The best treatment of aero-otitis is decompression in the pressure chamber (or re-ascent in the aircraft) to the level at which the eustachian tube block occurred, followed by gradual descent to ground level, while the patient swallows frequently. Ventilation of the middle ear must be performed with a gaseous mixture roughly in equilibrium with the partial pressures exerted by the gases in the circulating capillary blood. Thus, if at high altitude pure oxygen is breathed, it must be replaced in the middle ear by normal atmospheric air as soon as possible, or the excess oxygen will be absorbed, and a serous exudate will form, especially if the airman is asleep and the eustachian tube remains closed.

It is not yet clear that the surgical treatment of otosclerosis is successful even in selected cases. Preservation of the fistula is difficult and failure common. It must also be remembered that the pathology of the disease involves atrophy of nerve-fibres. More evidence is accumulating to show that the prompt exhibition of sulphonamide drugs in full doses helps the resolution of acute otitis media and is materially lessening the incidence, not only of mastoiditis and its complications, but even of the need for myringotomy. A little more information is given of the action of penicillin, and the editor is certain that it has a selective effect upon staphylococcal infections.

Pressman's cinematographic study of vocal cord movements is perhaps the most original work mentioned. The cords act in the production of pitch and intensity not merely by increase or decrease in tension, but also by vibrating in segments. The posterior portions of the cords progressively meet, leaving smaller and smaller lengths of the anterior ends to form the glottic chink. Laryngeal tuberculosis is declining in incidence, and an account is given of 500 cases divided into hæmatogenous and bronchogenic types, of which the former is not usually associated with pulmonary signs, but is often combined with ulceration of the pharynx and other portions of the upper alimentary tract, and is on the whole of worse prognosis. There is no new material on the treatment of neoplasms.

Constitution and Disease

JULIUS BAUER, MD, professor of clinical medicine, College of Medical Evangelists, Los Angeles, California; formerly professor of medicine, University of Vienna. (Heinemann. Pp. 208. 21*s.*)

MOST diseases are neither purely environmentally nor purely constitutionally determined, but depend on factors of both kinds. It has been shown that peptic ulcer is five times, and carcinoma of the stomach four times, as common in the families of peptic-ulcer patients as in those of patients suffering from other diseases. Professor Bauer illustrates his discussion of the clinical application of such observations with abbreviated case-histories, from a clinical experience which must have been as full of insight as it is wide. In a way that is more anecdotal than systematic in style, and yet convincing, he discusses the manifestation of the hereditary constitution in a generalised bodily habitus, and in inferiorities of certain tissues, systems or organs; and the significance of individual peculiarities of the integrative systems, endocrine and nervous. He lays great weight on the importance of a psychotherapeutic attitude in the handling of ordinary organic disorders. He cites the case of a young man who had to have both testicles removed for tuberculosis; the surgeon inserted a dummy, and led his patient to believe that only one testis had been extirpated. Despite the development of a complete eunuchoidism, the patient was encouraged to lead a normal sexual life up to his death of miliary tuberculosis in advanced middle-age. He strongly recommends the sensible use of placebos, and believes that many drugs with known physiological effects more commonly benefit the patient through suggestion than through their specific action. Medical tradition discourages the doctor from prescribing drugs in this way unless he can take in himself as well as his patient with his own hocus-pocus. Bauer criticises the attitude by which medicine is turned from an art into a sort of super-science, so that the individuality of the patient is lost behind X-ray films and laboratory reports.

Solving School Health Problems

DOROTHY B. NYSWANDER, PhD. (Oxford University Press. Pp. 377. 11*s.* 6*d.*)

IN the United States, as in this country, dissatisfaction with the efficiency of the school medical service has been felt for some time and researches, of which this book describes one, have been undertaken to find the cause and to suggest remedies. The story opens with an account which might apply to many places in this country of physicians carrying out stereotyped inspections without any imaginative backing, of medical records gone astray, and of the many other difficulties familiar to all in this field of medicine. This is followed by an evaluation of the work of the various participants in the service carried out with meticulous accuracy that involved, for example, the timing of a nurse in all her activities throughout her working day by means of a stop-watch. Then come special chapters on the filing and compilation of school medical records, the approach to special defects, and the reactions of private practitioners to the school health service. As a result of all this, reforms were introduced which—the last chapter of the book implies—had a considerable effect in raising the standards of the service. These suggestions must be studied in their own context and judged in relation to conditions in America.

The study undoubtedly had a rejuvenating effect, first on the medical services of the health district in which it was carried out, and ultimately on all the schools of New York in general. But it is possible that these improvements were the result, not of the innovations recommended, but of the fact that at last somebody was showing some interest in the work of the school medical service. Morale is not really to be measured by stop-watches or improved by modifying the layout of a record card. The book is not one which will have a wide circulation because its appeal is limited to a comparatively small section of the profession. But it is undoubtedly stimulating and has arrived opportunely when reforms are in the air.

Bradley's Topographical Anatomy of the Dog

(4th ed.) Revised by T. GRAHAME, FRCVS. (Oliver and Boyd. Pp. 316. 28*s.*)

THE fourth edition of this well-known work has been improved by the addition of some newly discovered facts and by X-ray photographs and fresh diagrams. It is now comparable in scope, method of presentation and in its excellent coloured diagrams with the best of the standard textbooks of human anatomy. It also includes much detailed instruction for dissection and should be of value as a work of reference to teachers and students of comparative anatomy and veterinary science.

ROYAL EYE HOSPITAL, LONDON.—Meetings of the Clinical Society of this hospital have been resumed, and at 4.30 PM on Friday, July 16, Dr. R. D. Lawrence will give a lecture on diabetes and eye diseases. Anyone interested will be welcome.

THE LANCET

LONDON: SATURDAY, JULY 3, 1943

MENINGOCOCCAL INFECTIONS

The meningococcus was isolated by Weichselbaum, in 1887, from a case of cerebrospinal fever, and until lately a large proportion of the medical profession looked on it solely as a cause of meningitis; even today the other manifestations of meningococcal infection are sometimes forgotten. Yet Gwyn[1] grew this organism from the blood-stream and knee-joint fluid in a case of meningitis in 1899, and the existence of a chronic meningococcal septicæmia, not necessarily associated with meningitis, was demonstrated soon afterwards. The chronic septicæmia achieved some recognition in 1914–18, and during the present war it has become more widely familiar. The clinical picture is fairly characteristic—acute onset of illness with fever, which may be of various types, general symptoms of infection, localised joint and muscle pains, usually a leucocytosis, and a rash, consisting usually of crops of circular pink spots, ranging in diameter from about 5 mm. upwards, often tender and often having a purpuric centre in the bigger spots. The meningococcus can be obtained by blood-culture in many cases, though repeated attempts are commonly needed. This illness is likely to be diagnosed initially as influenza or rheumatism, or sometimes as erythema nodosum, and if not recognised and treated with sulphonamides may persist for months, and may end with a spread to the meninges, though the cerebrospinal fluid in the chronic stage may be absolutely normal. Many cases of meningococcal meningitis give a history indicating a preliminary septicæmic phase, but as a rule this is quickly over.

In sharp contrast to this chronic illness is the fulminating meningococcal septicæmia in which a patient is taken ill and dies within a few hours. This fulminating form appears in various guises: there is sudden fever, with a very rapid deterioration in the general condition and a rash which is usually petechial with some larger purpuric elements; the blood-pressure may be normal or fall dramatically; the mental condition may vary from alertness to delirium or persistent deep coma. The relation between symptoms and pathological processes has been made much clearer by Banks and McCartney.[2] In 1942 they showed that parenchymatous changes in the central nervous system, in addition to the meningeal infection, were much commoner than generally realised, not only in the fulminating forms but also in acute meningitis. These changes consist in congestion and œdema, with capillary thrombosis, followed later by inflammatory polymorph cuffing around the vessels of various parts of the central nervous system; the condition may be generalised or focal. Clinically the symptoms of acute meningitis are complicated by those of encephalitis, especially continued deep coma, cyanosis and stertorous or irregular breathing. These cases usually end fatally without recovery of consciousness, notwithstanding the use of chemotherapy. It was suggested that the encephalitic changes are largely toxic, due to an overwhelming initial toxæmia through massive infection, and that these toxic changes lead to the fatal result, even when chemotherapy has successfuly cleared up the infection. Banks and McCartney did record one case which recovered, where there was evidence of encephalitis in the development of temporary parkinsonism after recovery from the acute stage. Some of the cases they described also showed hæmorrhage or thrombosis in the adrenals, and the adrenal changes have been discussed in greater detail in their recent paper.

The association of a fulminating septicæmia with bilateral adrenal hæmorrhage and circulatory failure has become popularly known as the Waterhouse-Friderichsen syndrome, but Banks and McCartney point out that there is no valid reason for the retention of this eponym. From the pathological standpoint the adrenal lesions are varied in character, pure hæmorrhage (hitherto by far the best recognised), thrombotic necrosis with peripheral hæmorrhage, gross œdema without hæmorrhage but with areas of polymorph infiltration, and combinations of these lesions being represented. In the cases they describe these lesions were all extensive, and involved the medulla and adjacent parts of the cortex; sometimes the remaining cortical cells were definitely disarranged by the pressure. It seems probable that if careful histological examinations of the adrenals were made as a routine similar changes would more commonly be found. Mitchell and Angrist[3] described 18 cases where focal necrotic changes were found in the adrenal cortex in the course of routine post-mortem histological examinations in a series of patients dying from various, usually infective, conditions. From the 11 cases which Banks and McCartney describe, 8 of which were studied at autopsy and 3 of which recovered, they differentiate two different clinical adrenal syndromes—the pure adrenal syndrome and the mixed or encephalitic adrenal syndrome. The two have in common the sudden onset with fulminating septicæmia and purpura, with very low blood-pressure, imperceptible pulse and collapse, and usually cyanosis; but in the pure adrenal syndrome the mental condition usually remains clear to the end, whereas in the mixed syndrome there is early coma which persists. In the former, respiration is either normal or there is dyspnœa of the air-hunger type, whereas in the latter there is rapid stertorous breathing, finally of the Cheyne-Stokes variety. Three cases, assumed from the symptomatology to be of the pure variety, recovered under active therapy with sulphathiazole, together with replacement therapy by repeated administration of cortical extract and desoxycorticosterone acetate over the critical period. Last week, Morison described autopsy findings in 3 children, one of whom was brought to hospital dead, the others dying within an hour of admission. In all 3 there was extensive hæmorrhage into the adrenals, and though the causative organism could not be identified the probability seems in favour of the meningococcus. Morison questions the accepted belief that the circulatory failure is due primarily to the adrenal lesion, and suggests that the peripheral vascular upsets may be of first-rate importance, the adrenal changes being merely contributory to the usually fatal outcome; it is well known that adrenalectomised animals withstand shock badly. On these grounds he urges the importance of energetic attempts to restore normal vascular conditions by the administration of plasma as well as adrenal substitution, which he relegates to second place. The use of plasma or blood in addition to cortical therapy was also recommended by Grace, Harrison and Davie,[4] who recorded a success with this treatment.

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[1] Gwyn, N. B. *Bull. Johns Hopk. Hosp.* 1899, 10, 112.

[2] Banks, H. S. and McCartney, J. E. *Lancet*, 1942, i, 210; *Ibid*, June 19, 1943, p. 771.

[3] Mitchell, N. and Angrist, A. *Amer. J. med. Sci.* 1943, 205

Two lessons are to be learned from this work. First, meningococcal infection is often, or even usually, septicæmic, and meningitis is only one manifestation of infection. Secondly, impending adrenal and vascular failure must be looked out for in meningococcal (and other) infections, and combated actively when it occurs; the prognosis in cases with sudden adrenal failure is grave but not hopeless.

MECHANISM OF BLOOD CLOTTING

Forty years ago Morawitz propounded the theory that blood-clotting is a two-stage mechanism: in the first stage the prothrombin of blood-plasma in the presence of calcium ions and a tissue or platelet factor (thrombokinase, thromboplastin) is transformed into thrombin; in the second stage the thrombin acts on the plasma-protein fibrinogen, converting it to the relatively insoluble fibrin which forms the scaffold of the clot. The framework of this theory is now generally accepted, but there is still much controversy about the detail. Useful information has been obtained from studying the blood-clotting activity of certain proteolytic enzymes, and by following the kinetics of the reactions. Eagle[5] showed that trypsin and certain proteolytic snake-venoms in proper concentration "activated" prothrombin to thrombin, and in this reaction calcium was not necessary. The concentration of trypsin had to be optimal; if it was too weak there was no action at all; if it was too strong both prothrombin and thrombin were destroyed. He compared the rates at which thrombin was formed from prothrombin by calcium-platelet mixture, crystalline trypsin, and the snake-venoms; very similar curves were obtained. He therefore suggested that the normal action of the calcium-platelet combination was to form an enzyme that converted prothrombin to thrombin; much as the trypsinogen of the pancreatic secretion is converted by the enterokinase of the intestinal secretion into the actively proteolytic trypsin.

In the early days of blood-coagulation studies, Schmidt suggested that thrombin was a proteolytic enzyme acting on fibrinogen; though not accepted by many, this has remained a possibility, and here again study of the action of known proteolytic enzymes has brought support. Eagle has shown that some snake-venoms clot blood by acting directly on fibrinogen and converting it to fibrin; they are active in very high dilutions, their power varies as their proteolytic activity (estimated by their action on gelatin), and their optimum pH is the same as that of thrombin; the proteolytic enzyme papain shows similar properties. Eagle therefore looks on blood-clotting as the outcome of the reaction of two proteolytic enzymes:

(1) Inactive prothrombin + activating proteolytic enzyme → *active proteolytic enzyme thrombin.*

(2) Fibrinogen + thrombin → fibrin.

The system whereby the precursor of a proteolytic enzyme is activated by a second proteolytic enzyme has already been found by Kunitz and Northrop[6] in the activation of chymotrypsinogen by trypsin, and the blood-clotting system appears to be similar.

All this left unanswered two interlocking problems: Why does the blood not clot in vivo, and how is reaction (1) set off? Howell's theory was that circulating heparin acted as an anti-prothrombin and thus prevented blood from clotting in vivo, but when blood was shed a neutralising thromboplastin formed by disintegrating platelets had to be postulated. Eagle also allows that it remains doubtful how the platelets and calcium ions are induced to form the activating enzyme only when blood is shed. Ferguson[7] now suggests an explanation for some of the difficulties. He thinks that the activating proteolytic enzyme is to be found in the non-specific proteases that can be demonstrated in tissue, blood-cells and serum, those with a trypsin-like action—tryptases—being important. Under certain conditions this enzyme can also digest prothrombin and thrombin—thus explaining the variable anti-thrombic activity of serum—and can digest fibrinogen and fibrin causing "fibrinolysis." Normally the enzyme is inactive; "damage," he says, "i.e. colloidal disturbance, introduces new conditions favourable to activation of the enzyme." When it is free, the tryptase in conjunction with ionised calcium and free phospholipid acts as the agent for conversion of prothrombin to thrombin. Ferguson points out that tryptase-inhibitors exist in normal plasma and serum, and there is evidence that they are chemically similar to heparin, but similar inhibition can be produced by several other substances. These tryptase-inhibitors are thought to be present in sufficient concentration to prevent in-vivo coagulation.

The main differences between the two theories are as follows. Eagle believes that the first link in the chain is formed when blood is shed by combination of disintegrating platelets and calcium; he assigns no place to heparin or phospholipid (cephalin), accepting the evidence that these are unnecessary and their importance unproven. Ferguson believes that the initial enzyme is the normal tryptase present in the blood in an inactive form; it is activated when blood is shed by cephalin and calcium, but he does not know precisely how; since cephalin and calcium are present in the blood, some tryptase may be activated in vivo and is kept in check by natural anti-tryptases, of which heparin may be a type Ferguson asserts that serum-tryptase variations account for difficulties in the preparation of plasma products; but others might retort, and quote figures in support, that platelet disintegration is responsible While the crux of blood-clotting—the means whereb the chain of events is set in train when the blood is she —remains unsolved, Ferguson's claim to a comprehensive hypothesis seems premature. But the physician will gather that the names he has learnt t associate with the twofold reaction of blood-clotting conceal a system of enzyme and activator such as he has met with elsewhere in physiology.

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[4] Grace, W. H., Harrison, G. V. and Davie, T. B. *Lancet*, 1940, ii, 102.

[5] Eagle, H. *Medicine, Baltimore*, 1937, 16, 95; *J. exp. Med.* 1937, 65, 613; Eagle, H. and Harris, T. N. *J. gen. Physiol.* 1937, 20, 543.

[6] Kunitz, M. and Northrop, J. H. *J. gen. Physiol.* 1935, 18, 433

[7] Ferguson, J. H. *Science*, 1943, 97, 319.

TOPOGRAPHY OF DIPHTHERIA BACILLI

A tellurite-containing medium has many advantages over the Loeffler slope in the investigation of diphtheria. Besides improving bacteriological diagnosis (the Loeffler slope misses 10–30% of clinical infections), the newer medium eliminates false positive reports on cultures from nose, ear or wound, it facilitates the detection of carriers, and by type-determination it obviates the need for virulence tests in a large proportion of cases since practically all gravis and intermedius strains are toxigenic. Type-determination also helps towards a better understanding of the epidemiology of diphtheria and explains why the fatality is low in one area and high in another, according to the prevalence of the milder mitis infections or the mo. medius diphtheria. The Laboratory Service in its A analysis of the distributio gravis types of diphtheria bacilli during 1941, based on swabs from 8457 diphtheria patients examined at twenty laboratories, including a number of independent but associated laboratories such as those at Leeds, Liverpool and Bristol. Their material is drawn from varied, but not all, parts of the country, and unfortunately the numbers examined at individual laboratories are often too small to be significant. Liverpool was not only heavily infected with gravis but contributed about a third of the total cases and therefore loaded the gravis figure; excluding Liverpool, the average percentages become: mitis 27, intermedius 39·6 and gravis 33·4. In individual centres distribution was very variable; thus Leeds showed a high incidence of gravis and a low of intermedius; Cardiff a very low gravis incidence with high figures for the other two strains; Bristol and Carmarthen were unique in having a very high intermedius rate. In Cambridge, Conway and Oxford the gravis percentages were about 50; in Liverpool and Leicester gravis accounted for over 70%. Geographical distribution was not clear-cut; altogether the data suggest that gravis is the prevalent infecting type in north, east and central England, while intermedius and mitis are more common in the south-west, but figures for other areas including London are needed to fill in the gaps. It was possible to compare the types found in three cities in 1940 and 1941, for Bristol, Leeds and Liverpool preserved complete figures derived from much the same area in each year. The change in frequency was statistically significant. To quote one example, the percentages in Leeds in the two years were mitis, 52·1 and 33·4; intermedius, 8·8 and 15·3; and gravis, 39·2 and 51·3.

Practical difficulties prevent a fair comparison of fatality with incidence of types. Thus every laboratory examined swabs from districts outside the town in which it was situated and not all cases notified in a particular borough were necessarily reported on by the laboratory in that borough. Again, notifications included cases diagnosed clinically before bacteriological examinations had been carried out, and the diagnosis of such cases, if reversed on bacteriological examination, would not be corrected in the returns for some time to come. Anything from a third to nearly a half of cases diagnosed clinically by practitioners failed to yield diphtheria bacilli in the laboratory, but this does not mean that none of these bacteriologically negative children had diphtheria, although they are always present not every clinically indubitable case yields up its diphtheria bacilli to the swab, and to wait for bacteriological confirmation before taking action may, as every clinician knows, spell tragedy for the patient. Centres with the highest fatality also experienced a high gravis rate, but a fatality of under 4% was recorded in Leeds, Cardiff and Bristol with gravis rates 51·3, 6·8 and 8·2%. The fatality from the three types varies considerably in different areas and at different times, and it is not usually possible to pick out the particular cause operating. The factors that have to be considered are general, social, and economic conditions, virulence of the prevalent type, stage of the epidemic (waxing, waning or at its peak), standard of administrative and medical treatment, degree of immunisation of the community, and age-distribution of the cases. Careful analysis of the experience of Liverpool during 1937–40[1] showed that the percentage incidence of mitis fell from 41·1 to 17·1 and of intermedius from 24·7 to 13·3, whereas that of gravis rose from 34·2 to 69·6 in these four years. The fatality from each of the types remained remarkably constant at about 2% for mitis, rather more than 10% for intermedius and 6% for gravis infections. The high fatality from intermedius infections in this Liverpool inquiry bears out the general experience that in clinical severity, other things being equal, there is little to choose between gravis and intermedius infections. Scotland has lately experienced an epidemic wave of gravis infection with an increased fatality, a greater attack-rate in older age-groups, and in certain areas a high incidence among inoculated children—all evidence of infection by an epidemic invasive strain.

From a consideration of these and other data, Russell[2] thinks it possible that the type change is related in some way to the number of susceptible children in the population—gravis type prevailing when the proportion of protected children is low, mitis type when it is high. Yet it is not proven that the gravis infection always connotes high mortality. The *Bulletin* hopes that further work will reveal what effect artificial immunisation, if it becomes universal, will have on the type-distribution of diphtheria bacilli. Some localities should already be approaching the degree of immunisation when we may see a change in the prevailing types, although as D. T. Robinson[3] foresaw atypical strains and difficulties of classification are likely to arise where the disease is mild and none of the types has an epidemic distribution. If so, news of such increased technical difficulties of typing will be welcome because it will imply that immunisation has reached a pitch when, extended to the greater part of the most susceptible population, it will reduce the incidence of clinical cases. That such a reduction in incidence, occurring in conjunction with large-scale immunisation has in fact been a case of cause and effect

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1. Wright, H. D. *J. Path. Bact.* 1941, 52, 283.
2. Epidemiology of diphtheria during the last fort Russell, D.Sc., of the statistical staff, Medical Resc Rep. Ser., 247. HMSO, 1s.
3. *J. Path.*

been difficult to prove. Statisticians have with justice looked doubtfully at some of the figures used in evidence. From his careful study of the North American data, Russell is, however, satisfied that immunisation, particularly since the inclusion of pre-school children, has substantially reduced morbidity and mortality in such towns as New York and Toronto. Their experience of diphtheria in the post-immunisation years has been significantly better than would have been expected from the trend of morbidity or mortality in the pre-immunisation period. This previous trend too should have led to epidemics in both cities between 1930 and 1940 and yet none occurred. Except for their immunisation campaign there is no obvious reason why they should have been singled out for their very favourable position. Russell's work is, therefore, a strong source of encouragement to workers in this country and deserves close study.

Annotations

THE NURSE WITH TUBERCLE

The chances of recovery for the nurse who acquires tubercle have not, as far as we know, been statistically examined, but a well-informed correspondent (p. 30) tells us the present position of 59 tuberculous nurses known to her. Of this group, 8 are known to be dead and 3 more may be; 18 are ill at home or in sanatoriums; only 18 are working, 17 of them as nurses either at their own hospitals or in sanatoriums. No claim is made that the series is a representative sample, but it may give a rough idea of the prospect ahead of nurses who contract the disease—not a very reassuring one, it seems. In 15 at least (of whom 4 have since died) the prospect was known to have been clouded by economic difficulties. Though in theory a nurse disqualified for her work by tuberculosis gets total disablement benefit (amounting to 9*s*. a week for a single woman) there may in practice be several reasons, including the rules of the approved society to which she belongs, why this sum is reduced. She may not be entitled to full benefit, because she has not been a contributor long enough (and this is the more likely because tubercle is apt to strike early); or she may have fallen out of benefit because, for example, she gave up paying contributions while she took a midwifery course, when she needed all her money to live. Her financial position contrasts sharply with that of a woman similarly infected while serving in the Forces. In one sanatorium a tuberculous sister aged 44 was receiving 2*s*. 6*d*. a week, while an ATS girl who had been in that service only 2 years was receiving 9*s*. 6*d*., and at the same time having 11*s*. a week saved for her. It is true that a nurse who contracts tuberculosis and becomes unfit for work will usually be offered asylum in a sanatorium during the remaining years of her life: but this only provides her with food and shelter. She will still need money for outdoor clothing (if she is well enough to go out), for soap and stamps and stockings, and to supplement her diet now and then with something she fancies. These almost basic needs cannot be met on three or four shillings a week.

If she is well enough to work on the staff of a sanatorium she is sometimes subject to stringent rules, designed to protect her uninfected colleagues. Thus she may live in isolated quarters and be forbidden to enter the nurses' home; she may have to take her meals after the patients have finished, when the food is a little cold; she may eat her Christmas dinner alone and be advised to stay away from the annual dance. In the wards she works side by side with her healthy fellows, but outside the wards she is segregated, and inevitably feels cut off the hope of normal life. Quite a number of sanatoriums are run largely by ex-patients—Nayland was an example—and in these of course a sense of isolation does not arise. But in some institutions of the kind the supervision of nurses' health is not always adequate. Now that the shortage of staff is acute there is a strong temptation to expect full-time service from anyone who is fit to work at all. Again, instead of being directly under the doctor, the nurse may have to report any fresh symptom to the ward sister or the matron, who decides whether the doctor should see her or not. While most sanatorium matrons and sisters would err on the side of over-caution, an honest impatience with trifling ailments in nurses is rather deeply ingrained in some of the seniors in the profession, and nurses have experienced rebuffs which have led to delay in treatment. And when the nurse leaves the sanatorium and goes home she will get variable treatment depending on the part of the country in which she lives. In some areas there is a well-organised expensive scheme; in others facilities are scarce.

Whether the incidence of tuberculosis is higher among nurses than among their contemporaries in other professions is not certainly known. Dr. Esther Carling[1] has made a plea in our columns for the publication of figures either to prove or disprove this. The Prophit survey[2] has given us the radiological findings in some 1500 hospital nurses, voluntary and municipal, at a first examination. The follow-up was broken by the outbreak of war, but has since been resumed and its results are eagerly awaited.

THE BROKEN HEEL

A crushed os calcis is a serious injury, whether it is acquired by taking a false step from a ladder, by striking one's heel on the keel when sliding down a sinking ship's side, or by having one's ship or tank blown up by a mine. The difficulties begin with diagnosis; the associated sprain may overshadow the bony injury, or where there is no sprain the crushed bone may be deceptively painless. It is easy, too, to overlook a slighter fracture on the other side in bilateral cases. Trethowan used to emphasise the difficulty of treatment by saying that the best was a Syme amputation. In the last two years Böhler's method, in which reduction attained by screw traction on a transfixion pin and compression in a small vice is followed by immobilisation in plaster for 10–14 weeks, has got a bad name. Bankart[3] calls its results rotten, however accurate the reduction—with few exceptions, he says, it leaves a stiff foot with which no man can do a day's work. Gray[4] says it may give satisfactory radiological appearances, but besides promoting stiffness it introduces the risk of sepsis and encourages compensation neurosis because of its awe-inspiring apparatus. Few surgeons now put in pins to reduce the deformity; except perhaps when there is eversion of the heel. Gray has returned to the conservative treatment advocated by Hogarth Pringle in 1910. Any appreciable broadening of the bone is reduced with a hand clamp, but otherwise no reduction is attempted. The foot is then kept elevated, massage and movements, such as kneading a mudbath with the feet, being given but weight-bearing prohibited until consolidation is complete, judged by the disappearance of tenderness on deep pressure; this takes 2–3 months. Alternatively, the foot may be immobilised in plaster for the same period, but some say that this stiffens the foot by promoting the organisation of blood-clot. In 20 out of 23 cases these methods fitted the patient for work in 12–26 weeks; the foot, says Gray, if not painless is at least comfortable. Bankart, however, though he agrees that the results are better than after reduction and plaster, says that sooner or later traumatic arthritis produces a stiff and painful foot. Where the subastragaloid joint is involved he recommends an immediate triple arthro-

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1. *Lancet*, 1942, i, 519. 2. *Ibid*, 1942, ii, 464.
3. Bankart, A. S. Blundell, *Ibid*, 1942, ii, 175.
4. Gray, C. H. *Ibid*, 1942, i, 106.

desis after excision of the scaphoid and of the cartilage from the head of the astragalus and bases of the cuneiform bones. This is followed by 4 months in plaster. In 2 cases the method left active painless feet. The operation must be done early, before the foot becomes rigid. Creer[3] maintains that, though a triple arthrodesis is necessary when the midtarsal joint is involved as well as the subastragaloid, it is better when the fracture reaches only the subastragaloid joint to arthrodese only the posterior part of that joint. If necessary he inserts a bone graft to regain the normal curve of the midtarsal joint. Others fix this joint, which is often the only painful one, by a graft driven downwards through the neck of the astragalus into the os calcis.

THE PROPER PLACE FOR CHILDREN

FOR some years medical opinion has been hardening into a belief that children under the age of 2 should not be gathered together in groups, either in sickness or in health. This belief was strongly confirmed at a meeting of the Medical Women's Federation on June 23, when one speaker after another condemned the practice of leaving these young children for long hours in day nurseries, however good. Infection rates are high among them, and there is evidence that an infant resents the loss of its mother for long periods quite as much as an older child who can express his views more intelligibly. Dr Marjorie Back (Middlesex county council) pointed out that the day nursery does not solve the problem of the woman who is doing whole time work; she has no leisure to keep her home clean or to wash and mend for the children, who are bandied to and fro at fixed times between surroundings of extreme squalor and impeccable hygiene. The place for the baby under 2, Dr Back considers, is at home, provided it is a good home with a satisfactory mother. Some felt that even bad homes and unsatisfactory mothers were to be preferred to nurseries, for the child at home is at least not exposed to the unlimited chances of cross infection, and the health visitor can do something to ameliorate his lot. Mothers give as a reason for bringing young children to the nurseries that they cannot manage on their allowances—they must take work. But there seem to be good reasons for insisting that the mother of young children is not suitable to undertake whole time work. Dr Helen Mackay even doubted whether nurseries for older children were serving their purpose of releasing women for industry. She pointed out that to build and equip them uses a lot of labour, that breakages are high and proper supervision requires a large staff; yet the mother often has to stay away from work to look after a child with an infection caught at the nursery. During the course of an investigation she had spent long hours in both day and residential nurseries, and had come to feel there was a high incidence of infections in them and a low incidence of happiness. In two good nurseries taking 120 children, every child, over a period of 6 months, was absent through illness an average of one day in four. This bore out Dr Back's finding that in a group of nurseries, over 166 nursery months, there had been 1678 days of quarantine—that is, the nurseries had been closed to new admissions for a third of their working time. Children of mothers doing whole time jobs are left in the nurseries from 6 30 in the morning until 6 or 7 at night, and for the last three hours there is, Dr Mackay finds, a good deal of shouting from tired women, and most of the children are crying

Enthoven (National Society of Children's Nurseries), who finds that a properly run nursery can do much to teach the mother how to look after her child; and the conviction of several speakers that nurseries run in conjunction with a community health centre, like the pioneer centre at Peckham, would have a place after the war. Moreover there were no complaints of the nutrition of children in war time nurseries, evidence, as Dr G. I Brodie (Ministry of Health) pointed out, of the cooperative spirit of the Ministry of Food in giving the nurseries priorities in milk and other child building rations.

LILLIPUT LIBRARY

THE Surgeon-General's librarian in Washington is offering to send medical libraries in Britain microfilms of the G and H volumes of his *Index Catalogue*, so that the volumes themselves can be kept in safety till after the war. No doubt those libraries which have the necessary reading machine will accept his generous offer. So far the expense of these machines has combined with copyright restrictions to retard the progress of microfilms over here, though the threat of destruction by enemy action encouraged their use for copying valuable documents and business papers. For the last three years the Surgeon General's library has run a microfilm service which will supply a copy of any article in the 4000 periodicals filed there at the nominal price of 10 cents for every ten pages. The microfilm is a photograph, usually positive, on 35 mm cinema film. It can be read with a magnifying glass, but this will be a tiring process for more than a paragraph or two. The reading machines made in this country throw a magnified image about the size of the original document from above on a sloping screen which will stand on one's desk; they cost from £12 upwards, and the image is not always clear. In America the Rockefeller Foundation have helped in the production of a cheap and highly serviceable "student's reader," and in time we may see every student buying such a one as he now buys a microscope or a set of bones. Apart from its obvious value in providing cheap and portable reprints, the microfilm has made it possible to replace whole files of journals which have been destroyed in bombed or captured libraries, and Washington lately supplied microfilm copies of most of the medical journals current in the United States to fourteen centres in Free China which could not get the actual journals through. It would even seem possible to combine the airgraph and microfilm ideas, so that current articles could be sent to out of the way places like an airgraph letter. The difficulties of censorship could surely be overcome.

CONDITIONED AGAINST THE DRINK

IN Huxley's *Brave New World* the innocent babies destined for dull jobs crawled over to examine the pretty books and flowers, received an electric shock, and became conditioned against such frivolities for life. This principle—which should appeal to dictators—has not been much applied in medicine so far; but if anyone could profit from a ruthless reorientation of his inner life it would presumably be the chronic alcoholic. Many have aimed at turning these unfortunate patients sick at the sight of a bottle, and methods have ranged from putting an emetic in the drink to injecting apomorphine. Thimann,[1] following the lead of Voegtlin and Lemere,[2] believes that he has achieved an effective technique with emetine. The patient, who has had no food or sedative for 12 hours, is treated in a soundproof room which is painted a dull colour and contains, besides himself and his doctor, nothing but the two comfortable chairs on which they sit, a bar or table with bottles and glass on its spot lit top, and (out of sight) the necessary syringe. He is thus isolated from all stimuli except those connected with the occasion, which are purposely emphasised. Thus the treatment is given in silence; the sounds he hears are the clinking of glasses, the gurgle of poured liquor and finally his own retching. He smells the glass before and after drinking. The emetic solution used by Thimann is composed of emetine (gr. 50), pilocarpine (gr. 15), and ephedrine (gr. 30) in 40 c.cm. of water. An injection of 0·4–1 c.cm. of this solution is injected 4–12 minutes before the patient is given a drink. Treatment is given 4–7 times on successive days, and repeated on a single day after 1, 2, 3, 6, 9 and 12 months during the first year. Thimann has reduced the dose of pilocarpine recommended by Voegtlin and Lemere because he found a larger dose gave patients painful spasm of the bladder and intestine which distracted their attention from the treatment. He also increased the dose of ephedrine because chronic alcoholics have a low morning blood-pressure in any case, and emetine tends to lower it still further, even to the point of shock. He quotes the results of these predecessors in 1194 patients: less than 2 years after treatment 74·8% of 644 patients were still abstinent; after 2–4 years the figures were 52·5% out of 291; and after 4 or more years 51·5% out of 259. Thimann's own series only numbers 43 at present, followed over 7 months. Of these, 27 have remained entirely abstinent since treatment; but it is doubtful whether the rigours of the cure are entirely responsible, since psychotherapy accompanied the drug treatment, and patients were persuaded to spend all their weekends and leisure time at the clinic, so as to maintain a close bond with the physician. The full bearing of this father-child relationship on the abstinence (and its ultimate duration) is probably hard to assess; Thimann sees it merely as a useful adjunct to treatment. "By supplementing the monthly periods of reinforcement by weekly visits," he says, "the patient is prevented from slipping into the delusion of the conviction that he can take a social drink without relapsing." The impartial observer may feel that the value of the treatment is in doubt if the patient can take a social drink without being sick.

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[3] Creer, W S *Proc R Soc Med* 1943, 36, 333

[1] Thimann, J *New Engl J Med* 1943 228 333

[2] Voegtlin W L *Amer J med Sci* 1940, 119 802 Voegtlin, W L and Lemere, F *Quart J Stud* [illegible] 1942 2 717

A LIBERAL DIRECTOR

THE retirement at the end of July of Dr. Carl Voegtlin, first chief of the first cancer institute which any nation has supported from public funds, stimulates reflections not only on the personal attainments of a distinguished director but also on research institutes limited to the study of cancer. This limitation is chiefly verbal; there is no basic science which does not contribute towards an understanding of the natural history, pathology, cause, prevention or treatment of cancer. The National Cancer Institute, founded at Bethesda, Maryland, in 1937 by the government of the United States, set out to advance knowledge in all these branches, to apply the results, to educate the public, using as its medium the *Journal of the National Cancer Institute.* To have succeeded in making a start in all these directions in the first 5 years is a great achievement. Dr. Voegtlin brought to the task wide knowledge with special training and distinction in biochemistry. This circumstance accounts no doubt for a slight bias in the work of the institute towards chemical aspects of the subject, but none has been entirely neglected. The pursuit of every branch and of almost every suggestion despite prejudice and fashion is perhaps the greatest of the director's achievements. Yet, in the history of cancer research, no basic discovery has been made in an institution devoted solely to the study of cancer. Original observations of lone individuals, working often against opposition and violent reaction, have later been confirmed and extended in cancer institutes. Directors therefore have a great responsibility to cherish all the facts previously gathered, to retest and extend in the light of new knowledge all the theories of the past, and to close, for theoretical reasons alone, no approach discovered by the pioneers. The fullest achievement will perhaps be claimed in future by those institutions which find and ish the pioneers, in whom America is even richer than she knows. Since posterity will be the judge of their success, we of today are content to praise a liberal spirit.

The new director is to be Prof. R. R. Spencer, assistant chief of the institute.

SULPHONAMIDES IN PLASMA AND RED CELLS

WHEN sulphonamides are absorbed and reach the blood, they are not distributed equally between the red cells and the plasma, but the ratio varies with the different compounds. According to Heinemann[1] sulphanilamide is distributed so that the concentration in the water of the cells is about 1·6 times the concentration in the water of the plasma. For sulphathiazole the ratio is 0·17, and for sulphadiazine 0·3. Since the therapeutic effects depend on the concentration in the plasma rather than on that in the cells, it might be better for clinical purposes to estimate the concentration in the serum or plasma, rather than in whole blood as is the usual practice The difference in concentration between the cells and the plasma appears to be due to part of the sulphonamide in the plasma becoming "bound" to the plasma protein in which condition it is probably ineffective therapeutically. This combination with the proteins was first demonstrated by Davis[2] by ultrafiltration methods and has been confirmed by Heinemann, who finds that only about 10% of the sulphanilamide in the plasma is bound in this way, compared with 55% of the sulphapyridine 80% of the sulphathiazole and 60% of the sulphadiazine Although estimations of the concentration of sulphonamide compounds in whole blood are of real practical value as an aid to the regulation of dosage, it is clear that the drug cannot be regarded as being in simple solution; its distribution between the various components of the blood is complex.

TACHYCARDIA AND ALLERGY

Coca[3] describes a new diagnostic method which he claims provides a highly accurate practical means of identifying the excitants of food allergy. In general, food allergy is difficult to prove because cutaneous tests often fail, and the effects of trial addition and elimination diet are unsatisfactory in most cases. Coca noticed that some clinical reactions to foods were constantly accompanied by a tachycardia, and that this could be employed practically to detect the foods responsible; as a result he claims a high percentage of successes in relief of allergic symptoms. He recognises two categories of familia sensitivity: a patient of allergic heritage may show antibodies in his blood for some foods causing allergic symptoms (and positive skin tests), and, for others tachycardia without antibodies (and negative skin tests) The characteristics of this tachycardia are a high maximal pulse-rate (90 per min. or more) and a wide range (20 or more); tachycardia and remissions alternate rapidly, and there is a latent period; the reaction may be recurrent. The foods causing symptoms are usually common ones, anyhow in America (wheat, orange, egg beef, milk, tomato, potato, chocolate), but the excitan need not necessarily be foods, they may be drugs, metals inhaled fumes or dusts. The symptoms experienced in most cases after these excitants, and accompanying the tachycardia, are not the usual ones of allergy; they may be nervous and emotonial instability, psychic depression even epilepsy and dementia præcox; dizziness, neuralgia; chest-pain, angina pectoris, extra systoles, essentia hypertension; and even a predisposition to the common cold. The suggestions in the book are novel but no convincing. Coca admits that a fellow allergist had half-facetiously written: "Most of us are trying to prevent the term allergy from being applied to anything and everything from ingrown toenails to alopecia."

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1. Heinemann, M. *J. clin. Invest.* 1943, 22, 29.
2. Davis, B. D. *Science,* 1942, 95, 78.
3. Coca, A. F. Familial Nonreaginic Food-Allergy. Springfield Illinois: C. C. Thomas. 1943. Pp. 180. $3.

Special Articles

FULLER DEVELOPMENT OF FEVER HOSPITALS

WITH SPECIAL REFERENCE TO THEIR SCIENTIFIC MEDICAL SERVICES *

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FEVER hospitals were originally isolation camps rather than medical institutions. Their provision was, in the first place, elicited almost entirely by the necessity of removing from the community a group of cases with a communal "nuisance value" This removal, it was argued, would result in a lowering of the incidence of fevers in general. The obvious necessity for early isolation concentrated medical interest on rapid diagnosis, and as there was no specific treatment for any of the fevers it seemed adequate to establish places of seclusion where these cases could be isolated and to some extent nursed.

During the last 40 years, however there has been a gradual, and more [illegible] understanding of the fe [illegible] lding much to the prec [illegible] now being supported b [illegible] but of almost equal importance has been the growing realisation that even the most rigid policy of isolation makes little impression upon the average general incidence of the "native" infectious diseases This last fact is of considerable medical interest but its main and immediate significance is the problem it raises. Is there any further need for the fever hospitals to be continued as isolated separate units?

The answer to the question is on general grounds, No. There is now every reason why a general hospital, say in a small town, should have a block that can deal with the fever cases of the district. In the larger centres of population there are none the less two very good arguments for the continuance of the fever hospital; first, as a concentration point for therapeutic skill, and secondly, as a place where intensive and scientifically remunerative study can be pursued

For these two reasons alone the continuation of the larger fever hospitals is considered desirable. They should become essentially specialist hospitals with a function very similar to that of other specialist hospitals, and, like them, they have a place to fill in any scheme of regionalisation of the hospital services. In conceiving their future function, we must clear our minds of the long-established view of the fever service as something "isolated" from other forms of medical endeavour. The modern view indeed is that the infectious diseases are of prime importance, since despite modern therapy, they still cause serious morbidity and mortality in the youth of the nation, and only too often leave the young person handicapped for life. The intensive and academic study that must be given to these problems has not as yet been demanded by either the public or indeed the medical profession, the realisation of the need, however, is growing rapidly and the purpose of this paper is to suggest how that need can be met.

STATUS OF THE CLINICIAN

If [illegible] are to become main [illegible] demic research, it is of [illegible] should be of academic [illegible] trusteeship that is the [illegible] this country—to seek [illegible] to stand for the truth, and to give the patients the benefits that arise from his dedication. Development along this line is at present impossible since with advancing seniority he must spend more and more time as an administrator, and so much less time as a clinician. The conjunction of the offices of clinical chief and administrative superintendent was natural enough in the days when there was neither specialist treatment nor any general appreciation of the importance of research. (We need hardly recall the superintendent with a natural and active interest in research such as the late Dr. John Brownlee). Today, the physician-superintendent of a fever hospital must have a wide knowledge of general clinical medicine, including chemotherapy, bacteriology, pathology, biochemistry and radiology, to mention a few of the aspects of this specialty, while at the same time the administration of a modern hospital grows daily more complex. Every further advance in the knowledge of infectious disease will [illegible] ific know- [illegible] ed growth [illegible] y the dis- [illegible]

Under any scheme for concerted investigation into the causes, epidemiology and treatment of fevers, the position of the chief clinician must become of increasing importance To enable his full development it seems essential to adopt the already popularly mooted suggestion of an administrative superintendent (medically qualified) responsible for the administrative details of a group of fever hospitals, totalling say 1200–1500 beds, leaving the clinical chief free to supervise the more purely medical matters. Such a subdivision could be arranged and maintained and it would have the further advantage of developing a line of first class physicians for the fever service of tomorrow.

Under the present system of double duties there is little incentive for the junior man to increase his acquaintance of the related basic medical sciences (e g., bacteriology) or to improve his clinical knowledge, and little encouragement from above so to do, since the ruling officials are themselves almost purely administrative in function, and, therefore, in outlook. It is perhaps not [illegible] time lead the vanguard into the difficult regions of research.

Clinical appointments of the type we envisage should in view of their nature be made not by the regional hospital authority alone, but jointly with the university, and it is suggested that the chief fevers clinician of the district should be a reader in infectious disease attached to the university department of medicine. It does not seem absurd to imagine that the holder of such a readership might be a fit applicant for a senior teaching post in general medicine. Such an incorporation of the study and treatment of infectious disease into the main body of the practice of medicine would certainly have an invigorating effect on both activities. From the point of view of the management of fevers it is a matter of urgency to bring into being a service with wide contacts and high medical standing, capable of attracting men of clinical eminence Only thus can the service live up to the heritage of those who once made Britain's name in the clinical study of fevers

A further aspect of such appointments must be stressed—namely, that to bring out the best in the clinician it is essential that there be a limit to the number of patients under his care. We suggest that 350 beds (acute and convalescent) be regarded as the economic maximum To the administrative mind this may seem an extravagant use of medical personnel, but from the viewpoint of the patients' welfare and the utilisation of the best that lies in the clinician, we consider this rigid limitation to be justified. Where the number of beds exceeds this limit, an assistant clinician should be appointed. Incidentally the provision of such junior posts will ensure a source of future adequately trained chiefs.

The staffing of the fever service in the peripheral towns and rural areas is at the moment also far from satis-factory, and the gloom is only relieved by a few excep- tional characters who by their personal eminence [illegible] made spots of light in places and under circum[illegible] where such high standards could in fact [illegible] been expected. The regionalisation of hospital [illegible] to which so many are turning with hope [illegible] include the fever hospitals, and it [illegible] them an opportunity of obtaining [illegible]

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* This article forms the second part of a study of the future development of the fever hospital a general survey of the problems was published last year (Anderson, T *Glasgow med. J.* 1942, 138, 108)

high average quality. In such a scheme the larger provincial towns and more thickly populated semi-rural areas might continue to have their specialist fever hospitals, provided that these could support a full-time zymologist, who would belong to the service centring on the university centre. In contrast to these zones, which might be called the "peripheral centres," the small towns and the purely rural areas are in the future likely to depend for their hospital services on what we may call the county-type of general hospital. With modern transport facilities such an arrangement is quite practicable if the hospital be intelligently sited. The fever service for the rural area should be a unit of this county hospital; such a unit might be under the care of a full-time zymologist if the numbers justified it, but more commonly the full-time physician of the county hospital would be in charge of the fever block.

Although these rural areas and the peripheral centres will all branch from the university centre, it is not intended that they should be dependent upon or subservient to it, for much remains to be learned about epidemiology in the more rural areas. The appointments in the peripheral centres should, therefore, be capable of attracting senior clinicians. We do not support the view that those areas outside the main centre should be staffed merely by junior clinicians.

OTHER MEMBERS OF THE TEAM

The provision of a first-class clinical service is only the first move in the attack on zymotic disease. Research in modern medicine cannot be pursued economically by individuals, however brilliant; it calls for a team of workers, all with their own specialised knowledge. The most essential collaborator in the present case is the bacteriologist and there is little doubt that the study of epidemic disease and that of bacteriology must progress together. This conjunction has curiously enough been accomplished only to a small degree in this country, and the failure is without doubt to be related to the historical differences in the development of the two specialties. Bacteriology in Britain has reached its present eminence almost entirely within the walls of the universities and their associated general hospitals, while the study of zymotic disease has been pursued in the isolation of the fever hospitals. And yet, the fever hospitals above all desperately need a first-class bacteriological service, while these very hospitals could provide, in a way the present-day general hospital scarcely can, the most fertile fields for the academic study of bacteriology. Both these demands can be met and the necessary union of bacteriology with the fever service be effected in the following practical scheme.[†]

First, it is essential that each of the main fever hospitals in the university centre (e.g., in the city of Glasgow)[‡] should have a bacteriological department with a full-time director, appointed and paid jointly by the university and the regional hospital service. He would be responsible for the routine work of the hospital (and perhaps of the district surrounding the hospital) but it would be a proviso of his appointment that the routine work should not exceed a maximal amount, fixed so that he would be ensured freedom for thought and intensive research. The director of bacteriological services for the whole region would be the university professor, and he would be situated either at the university laboratories or perhaps more appropriately at the laboratory of the main fever hospital; the director of the laboratory not occupied by him should be the senior lecturer in bacteriology.

The study of biochemistry is a more recent addition to the field of medical research, but it has already added much to the knowledge and understanding of general medical diseases. Acute infections have as yet remained almost unexplored in this respect. Although it is certain that biochemistry will eventually play a highly important part in the study of infectious disease, it would seem that in the immediate future it would be sufficient to supply well-qualified technical assistants to each main fever unit to work under the general supervision of the laboratory director.

In the peripheral centres the combined general medical, surgical and fever services are likely to be of sufficient size to require a full-time bacterio-pathologist. Here, as with the clinician, the appointments should not merely be of a junior nature, although their value as training centres is obvious; they should be in themselves sufficiently attractive to encourage a suitable individual to remain even when he had reached senior rank.

The study of morbid anatomy in its widest sense we have left to the last. Although pathology has done so much to enlarge the knowledge of disease processes, it has flourished only where the authorities concerned have taken a long view; it is not a study that promises quick returns. Thus it has been situated in the universities and has served the related general teaching hospitals; this has naturally led to an almost complete preoccupation with the study of adult and terminal disease, and to a lack of opportunity for studying infectious diseases. Incidentally the modern tendency to remove all infective cases from the general hospitals has intensified this gap in British pathology, while modern surgery provides very few examples of infective disease and its behaviour. Further, since the value of pathology is largely academic (apart from the diagnosis of surgically removed tissue) there has been little actual demand for its help from the more purely utilitarian medical organisations, such as the fever service.

We cannot conceive, however, a properly directed study of infectious diseases in which research into their general pathology would not occupy a prominent position. The integration of the fever service which we have suggested would permit several hospitals to share the benefit of a first-class pathologist. It might be expected that a united fever group of 1000–1200 beds could supply a single full-time pathologist with adequate investigatable material, and yet not swamp him with routine work. Here again the person is more important than the post, and to attract a man of the right stamp and the necessarily wide training it is suggested that the director of pathology should be a university lecturer with a definite share in the teaching; he would, technically, work in close liaison with the regional director of bacteriology although his association with the university pathology department must be a real and close one. Further, his specialised knowledge of the morbid processes of infectious diseases would make him an obvious consultant on these matters for the whole region; the bacterio-pathologists of the peripheral hospitals would be able to refer to him upon all subjects coming within his sphere.

NEED FOR CHANGE

Such a plan, radical in nature, departs so greatly from the present establishment that it invites the usual critical questions. Is the change necessary, and if so, why? Even if we agree as to the need, is it great enough to justify the cost?

In answer to the first it can be said without fear of contradiction that there remains a tremendous amount still to be discovered about infectious disease. From the medical and ethical point of view, ignorance of disease is a challenge. Today this challenge can be met only by the concerted effort of a group of specialists, and it is in order to bring these men together, in conditions favourable to their work, that we regard the proposed changes as essential.

From the layman's point of view it is now a practical and realist measure to focus our resources on the preservation and restoration of the health of our youth. Every sick child in the kingdom should have an equal right to the best service that medical knowledge can provide. And to give this to the child stricken by an infectious disease demands, we believe, a service of a much higher standard than is general today.

CONCLUSIONS

There is an immediate and pressing need to concentrate medical endeavour on the fight against infectious diseases. This demands the creation of specialist appointments that will link academic medicine, centred on the universities, with a fever service incorporated in a regional hospital organisation.

[†] This scheme fulfils many conditions that we personally feel are essential, but these will not all be elaborated.

[‡] The reference to Glasgow and the related district is made since it happens to be the region we know best. Any mention of existing positions bears no reference to the present holders; we have intentionally avoided discussion with them or others whose minds are active on postwar planning, in the hope that our ideas may by their individual approach shed light on some small points that might otherwise have stayed in the shade.

The fever service team must include clinicians free of administrative demands, bacteriologists with a training that fits them for collaboration in research and pathologists of wide basic experience.

A scheme is briefly outlined that includes these essential workers, and provides for the future enrolment and scientific nurture of young specialists who may look forward to participating in an integrated active fever service of high medical and academic standing.

DOUBTFUL DIPHTHERIA

MEMO FROM THE FEVER GROUP OF THE SOCIETY OF MEDICAL OFFICERS OF HEALTH

ARTIFICIAL immunisation against diphtheria has much reduced the incidence of diphtheria and minimised the severity of attacks in protected or partially protected individuals. The difficulties of the practitioner called to see a case
increased by
diphtheria and

be safely made, and that diphtheria may occur, although comparatively rarely, in a Schick-negative person.

ns and require
s on the clini-
, while important, must be subsidiary. There is a tendency to place undue reliance on the result of swab examination. The bacteriologist cannot possibly distinguish between active diphtheria and the
interpreted in the
cases require a much
undertaken, and this should include examination for hæmolytic streptococci and Vincent's organisms. The value of routine swabbing before admission to hospital, which merely proves the presence or otherwise of diphtheria-like organisms, tends to be overestimated and usually results in delay in bringing the patient under expert observation.

DISPOSAL

number of days elapsing between onset and administration of an adequate dose of antitoxin. Antitoxin need
: the modern
rely gives rise

2. *Cases in which the practitioner is doubtful of the diagnosis on clinical grounds.*—These can be divided into two categories: (*a*) where the balance of probability is in favour of diphtheria; (*b*) where the balance of probability is against diphtheria (this will include cases with minimal symptoms—e.g., injected throat or watery nasal discharge in which a routine swab has proved positive). All such cases require continuous observation during which the fullest bacteriological and clinical investigation must be made. It is therefore obvious that such cases should be removed promptly to hospital

dealing with doubtful cases in many of the most modern hospitals:

(*a*) Those in whom delay in the administration of antitoxin would be dangerous if the diagnosis of diphtheria is ultimately confirmed. Such patients must be given antitoxin immediately and full bacteriological investigation made thereafter.

(*b*) Those in whom a delay of six hours would not be dangerous. The Schick test should be performed, swabs taken and antitoxin given six hours later.

(*c*) Those in whom a delay of one day or more would not be dangerous. The Schick test should be performed and swabs taken and the administration of antitoxin deferred until *the results are known.*

This classification obviously depends on the clinical experience of the observer. When in doubt give antitoxin. In no case is reliance to be placed on the swab alone as the information is sometimes misleading. Every suspected case, when first seen, must either receive antitoxin and be swabbed or must be Schick-tested and swabbed.

classed as a case of diphtheria, notified as such or sent to

logical diphtheria. The procedure for dealing with carriers of all varieties is fully described in the report of the London County Council Departmental Committee on the Nomenclature of Diphtheritic Diseases (1936).

Routine swabbing of contacts, except in special circumstances—e.g., certain institutional outbreaks—is to be deprecated, and should at any rate be restricted to those showing an unhealthy nasal or pharyngeal mucosa. The child with a healthy throat and nose is not likely to harbour the KLB for more than a very brief period, and, in the absence of a catarrhal condition, is not likely to disseminate diphtheria. ne and material occasioned by is not justified by the very occ[illegible] healthy carrier; it is high time that this practice was brought into line with scientific knowledge of cause and effect.

PROBLEMS OF THE SMALL HOSPITAL

be entirely
s no skilled
ave neither
, and where
laboratory facilities may be non-existent or elementary. Under such circumstances the proper course is to err on the safe side and give full doses of antitoxin as early as possible to every potential case of diphtheria.

It is becoming increasingly evident that the day of
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be to provide fever units with at least a third of the accommodation in the form of single-bed wards in the curtilage of large general hospitals.

CERTIFICATION

One of the main functions of an infectious diseases hospital should be the admission of doubtful cases for observatio
he large
provincial
by joint
boards, ha
The LCC
is prepared to issue instructions that "diphtheria observation" will be accepted as an adequate diagnosis for admission to its hospitals, and it is hoped that other

of diphtheria.

is not confirmed, it is high time that their attitude was changed.

Refusal on the part of hospital authorities to admit possible cases of diphtheria without a definite diagnosis may have one of two unfortunate results—it causes delay in bringing cases under skilled observation or it compels doctors to notify many cases, about which they are doubtful, as actual diphtheria. At present the error in notified diagnosis is very large; it varies in different parts of the country, being greatest in industrial areas—in London it is about 35%. Tonsillitis and rhinitis between them constitute some 80% of the errors, the remainder being made up of Vincent's angina, scarlet fever, measles, mumps, &c. Since the Registrar-General corrects only the small minority of cases in which the notifying doctor is invited and agrees to withdraw his notification, the discrepancy between the actual and the published figures of diphtheria incidence ia a serious one. Admission of cases on a "diphtheria observation" diagnosis will go a long way to end this vitiation of statistics.

General agreement to admit observation cases will undoubtedly result in earlier treatment with consequent reduction in mortality and complication rates. It will also entail provision of a larger proportion of single-bed wards than exists in most hospitals; newer knowledge of infectivity has already made the large undivided ward something of an anachronism and the procedure suggested may help to expedite long overdue improvements in fever hospital construction.

In England Now

A Running Commentary by Peripatetic Correspondents

WE have been having a complicated and rather sad time with Vallombrosa. He is a very brave man, an ex-member of the International Brigade, and he has developed multiple troubles which seem to vary between fibrositis and neuritis. He does not speak very good English, and he suspects that we do not understand him. He does not understand himself: sometimes it is the muscles, he says, sometimes the nerfs. We think he suspects the nerfs as being only attacked in functional conditions, the muscles as being organic. Hence his confusion. But at any rate things are now looking up. "Tonight," he said two days ago, "an enormous big change happen." "For the better or for the worse?" I said. "For the bad," said Vallombrosa. "The pain has gone from the leg to the arm." This reminded me of the time when an epidural injection into his sacral areas made his legs worse and entirely cured his chest, so I said I was sorry. But today a further change has occurred. "Today," he said, "it is a great deal much better. Terrible. Yesterday a little bit much better, today a great deal." "It's better?" I asked. "Terrible," said Vallombrosa. I am jolly pleased about this.

* * *

It was in September, 1939, and the war was about a fortnight old, when early one morning I was awakened from the uneasy sleep that was the common lot in those days. The nightmare that had come upon us, with its then unprobed horrors, made the ordinary round of existence seem fantastic and unreal, and one lived as under a heavy weight. There were unaccustomed sounds in our quiet road—the noise of motor engines slowing and coming to a standstill, the clank of metal, voices kept low out of respect for the early hour, and the crunch of Army boots on gravel. All this had to be investigated. Never had the maids risen so early (our staff was plural in those incredible days), and we soon knew that a large convoy was parked under the trees that bordered the road and hid the lorries from any inquisitive Jerry who might be snooping round. And—a much-appreciated action—each lorry was parked with due regard for every private gateway. Soon the men in charge were the guests of every house in the road, and as time went on, and the convoy still awaited orders, we made them free of the garden, with newspapers, smokes and refreshments. It was such heavenly September weather, and in the golden autumn sunshine tired men rested in deck-chairs, or slept, stretched on rugs on the lawn. When I came in from my rounds at lunchtime our friends had vanished. "I wish they had stayed longer," said my wife. "They were so nice, and the maids loved them. They insisted on washing up all the crockery they used, and just come and look at the garden." Rather apprehensively, I followed her out to our cherished plot. The deck-chairs had been closed and stacked, and on top lay the rugs, exactly folded. My wife picked up a basket that had contained apples. In one corner of it was a neat little pile of cores, and in another a matchbox, tightly packed with cigarette ends. Not a speck of litter was in sight. "Do you remember the garden after our last sherry party?" she asked. I did, and the heap of cocktail sticks, matches and cigarette ends swept up by the gardener afterwards. A light breeze was stirring in the borders, and in the sunshine the Michaelmas daisies and chrysanthemums, in all their autumn glory, seemed to nod their heads in pleasure and satisfaction, as though they knew that their country, with its gardens, would be well defended by such considerate hands.

This was more than three years ago, and much has happened since. We do not know what has befallen our friends, but some of them, at least, may be in enemy hands. Our surplus flowers and vegetables find a ready market locally, and the proceeds go to the Red Cross and St. John Prisoners of War Fund. The garden has not forgotten.

* * *

Adults forget what it is like to be young because it is on the whole an unpleasant, an impotent, a trial and error adjusting, a humiliating time, so that they repress the memory of it, or turn it into a story, an adventure, a Sunday-school, a boy who made good, an exemplary little Eustace story, according to adult need of bolstering. Let them read *In the Service of Youth* by J. Macalister Brew (Faber. Pp. 228. 7*s*. 6*d*.). Here they stand before the judgment seat of bared memory. The book deals with the service of youth chiefly from the angle of the girls' and boys' club, but it would be read with profit by anyone who has any contact with youth at all; the works doctor and the magistrate of the juvenile court should be compulsorily examined on it, not so much for its factual content, though that is invaluable, as for the almost—yes, I choose the adjective deliberately—divine humanism that pervades it. I lived for five years as a student in a boys' club in Hoxton. Frankly I was not a success, I never felt quite at home in the gas-lit, noisy club-rooms. I came more into my own at the weekend and summer camps, for the ways of bird and beast are not altogether unknown to me, and industrial youth can be intensely interested in these. Those were the days when people used to drift down from the universities to give their culture to the lower classes—and often get far more than they gave. Some came from duty, some seeking a childhood they had not known, some perhaps because they'd rather be first class in Athens than second class in Rome, some came with the love of brothers, some with the love of parents, and some (and I know that they were the best, for they still walk and talk in the memories of boys and girls who are now middle-aged men and women) with the undifferentiated swamping, unrebuffable, humble, humorous love for all things living. Nowadays the service of youth demands, besides the proper emotional equipment, technical knowledge and skill, and this is a most readable textbook. In fact it is a great brew, with the lemon peel of a pleasant humour, the nutmeg of discernment, and the Jamaica rum of a wide compassion.

* * *

My peripatetic colleague who laments his enslavement by the telephone bell and asks what is the remedy, reminds me of old Dr. S, for many years in practice in a Yorkshire country town. S had never had a telephone in his house and did not want one. Disturbed by this unconventional behaviour, the Post Office sent round an energetic young representative to convert him. Dr. S listened attentively to the benefits which would be his if only he would have a telephone. "Young man," he asked, "do you really think that your telephone would enlarge my practice?" "Why, of course, Doctor," the canvasser responded eagerly, "it most certainly would; I guarantee it." "In that case," said Dr. S, "you may regard the matter as settled."—The canvasser's eyes gleamed triumphantly.—"Any more work is the last thing I want, so I won't have your telephone at any price." Joking apart, would the GP really lose much by not having his name in the telephone directory?

Our sisters are only happy when there are one or two bats patients in the ward, and at least two of my wards are as happy as cuckoos nowadays. We have old men who leap out of bed, and old women who threaten to. We h[illegible] who writes letters to the rest of [illegible] indeed but little more so than [illegible]. But the nicest is Madame [illegible] gangrenous big toe. We have very affectionate conversations, and this is all right as she is seventy-five. "Hullo, darling," she says. "Hullo, my angel," I say. "The baby is asleep at present," she says. "And when it is asleep, I sleep." She also told me about her finger, which is the real point of this paragraph. She says she cut it off and it lay on the floor. "And I pick it up, and spit on it, woo-woo-woo like this, and I put it on again and look, you see?" Now what I want to know is, Can she have done this? If so, why don't we try it more often? Or is she just one of the pre-bats? I should honestly like to know, and no-one tells me.

Parliament

ON THE FLOOR OF THE HOUSE

MEDICUS MP

We have debated coal and we are assured that there is to be enough for next winter (but there must be no slacking); we have made a reform in the Foreign Service which will equip it better for the new world, and we have passed the second reading of the bill to set up the pensions appeal tribunal. Sir Walter Womersley has had a difficult course to steer in the House during recent months, but the second reading of the bill was almost completely calm. It is a much more comprehensive measure than the one passed after the first world-war, inasmuch as it includes the hearing of claims made by civilians who have sustained injuries from enemy action [illegible] Defence services and by [illegible] by the Navy, Army and [illegible] easure, the Minister said [illegible] to all claimants who had [illegible] ould send him a written [illegible] t this right at the earliest [illegible]

Each tribunal is to have a legal chairman and a medical member. The third member will be a layman (or laywoman) of the service or category of appellant concerned. For other ranks in the fighting services the lay member will be of other-rank status and for women's appeals of the female sex. For officers the lay member will be an officer; for civilians a civilian (i.e. "not a member of the armed forces"), male or female; for CD workers a male or female CD worker, and similarly for the Mercantile Marine. It was pointed out in the debate that this great increase in numbers and in the warrants, orders and Acts of Parliament which govern the question of entitlement to pensions very much complicates the matters to be brought before the tribunal. More power or facilities for the obtaining and presentation of evidence might be required than in the case of the 1919 tribunals. The position is made more difficult by the loss after Dunkirk of a whole series of base hospital records, and this also happened in Greece, Hong Kong, Malaya and Singapore, and elsewhere. The bill also provides for setting up later tribunals, consisting of a legal chairman and 2 medical members, to act as an appeal court against final assessments by the Minister.

At the committee stage an amendment is to be moved laying the onus of proof against an appellant on the Ministry and giving him the benefit of any doubt. Another amendment seeks to ensure that tribunals have pow[illegible] of appellants in calling exp[illegible]. While it is clear that the [illegible] the bill because in any event such tribunals are necessary, it is also realised that the essential matter is a change in the Royal Warrant. The anomalies at present are very many, and in view of the fact that our military and civilian forces are now so great in number, and that great forces will need to be maintained after the war, members are seeking for greater simplification. One medical member suggested the adoption of the "Beveridge principle" for the Services and proposed for consideration that any man or woman entering a [illegible] jury, [illegible] nces. [illegible] e in [illegible] stics, [illegible] to try to get [illegible] rcentage relationship of [illegible] to those so attributabl[illegible]

FROM THE PRESS GALLERY

Mines Medical Service

In the debate on the coal situation Lieut.-Colonel **Lancaster** urged that more medical advisers were needed than the one per region recommended in the White Paper presented a year ago. Only six medical advisers have been appointed so far, and those all within the last three months. Surely, in the light of the increasing age of the men in the coal industry and the strain of war-time, the Government would be well advised to push ahead with these appointments. Referring to suggestions in the press that malnutrition was a cause of absenteeism among miners, he said that medical research in the Midlands had found no signs of [illegible] much to the credit of the [illegible] **Lloyd George** said that the [illegible] the White Paper to reduce the number leaving the industry on the production of medical certificates had already had appreciable effect. The establishment of a medical service and a tighter control of man-power had reduced wastage by a figure exceeding a rate of 3000 a year. Further reduction should follow the extension of medical and rehabilitation services. Last year there were only two rehabilitation centres in the whole country; he hoped that they would soon have eleven working. The yearly total of absences from work, for 3 days or more, caused by sickness or injury was between 150,000 and 160,000, or one man in four. In 135,000 cases absence was for 8 days or more. The mining industry had a high rate of occupational sickness, and the miner was more prone than other workers to rheumatism But taking into account the number of men not employed in any one week, the effective rate of voluntary absenteeism was not more than 4½ per cent.

Mr. **Tom Smith**, parliamentary secretary to the ministry, dealt with the closer control of men getting out of the industry on medical grounds; some of the certificates, he said, looked a little doubtful on the surface. When the medical service was set up, with a doctor in each region, it was expected that certification would be stricter. He did not claim that reduction of wastage by 3000 was entirely due to the activities of the medical inspectorate, but they had certainly had something to do with it. Taking all in all and having regard to the shortag[illegible] department had done [illegible] service set up. Ther[illegible] the department wanted to get the right type of doctor to deal with the kind of cases that mining [illegible] to a committee of skin specialists. In the past 12 months there had been more rehabilitation of injured mineworkers than there had been in the last 40 years. "The one thing that pains me," Mr. Smith added, "as an old mineworker who has always been pretty strong, is that it usually needs a war to focus attention on some of these human problems" Men from the four Scottish coalfields were being treated at Gleneagles, and other centres were getting going. But it took far more to rehabilitate a mineworker for mining than for lighter [illegible] and a three-way method had been developed. First, the victims were compensated by a benefit scheme, the regulations for which were signed on June 22. Secondly, a committee of medical men and others had been set up in South Wales to advise the best methods of reha[illegible]ing the victims. Thirdly, and perhaps most im[illegible] of all, measures were being taken [illegible] dust. Answering the question why lads will not enter the mining industry, Mr. Smith cited his own experience :

> My father was a miner, and he said that I would never go to work in the pit while he lived. I did not until he died, and then I had to go into the pit. What he said was what thousands of mineworkers have said : 'My lad will never go into the pit if I can stop him.' They are still saying it. They want to see the lads have 'a better crack of the whip' in this world than they themselves have had. During the two or three years I spent on the Miners Welfare scholarship scheme committee I saw evidences of the tremendous amount of ability among the sons and daughters of British miners, but I used to be appalled when the question was put to these young people, 'Wouldn't you like to become a mining engineer ?' 'Oh no,' they used to say, and when they were asked why, they would say, 'My father developed silicosis, my uncle got killed,' and so on. They wanted any kind of profession but mining.

He had great faith in British mining, but much would have to be done to encourage boys to go into the pits—sound working conditions, provision for good training, brighter colliery villages from which young people would not run away as soon as their brains developed.

QUESTION TIME

Medical Services in Tunisia

Sir **Francis Fremantle** asked the Secretary of State for War if he would give some account of the arrangements and results of the hospital and medical services in Tunisia.—Mr. **Arthur Henderson** replied : Detailed figures have not yet been received from North Africa, but all reports show that the medical arrangements made were highly successful. The medical services which formed part of the North African Force included certain new units which had not previously been employed on active service. Such for example were the field surgical units, which were attached either to main dressing stations of field ambulances or to casualty clearing stations. These units are in effect highly mobile operating teams, designed and fully equipped to function as such in forward areas. Associated with them were the field transfusion units which have revolutionised the treatment of shock in the field. They conveyed and distributed the large quantities of blood and plasma used throughout the campaign, and together with the field surgical units played a large part in reducing the mortality-rate among casualties.

The evacuation of casualties on the whole followed lines which had been found successful in the past, but the evacuation was greatly accelerated by the transport facilities now available. These included ambulance cars, hospital trains improvised from rolling stock available locally, hospital ships and aircraft. American aircraft evacuated over 16,000 British and American troops. The divisional medical units on occasion handled as many as 400 to 600 casualties a day. The less urgent cases were sent direct to clearing stations, the cases in need of blood transfusion and resuscitation were retained, and the cases requiring immediate operations were dealt with by the field surgical units.

The hospitals in general used to accommodate casualties were general hospitals of 200, 600 and 1200 beds. The speed with which they opened on new sites and accepted casualties was one of the outstanding features of the campaign from the medical point of view. These hospitals were mainly accommodated in tents, although the administrative parts were often in buildings. Hospitals were provided with the necessary specialist personnel and equipment to deal with cases of all types, including surgical, medical, laryngological, ophthalmological, dermatological, psychiatric, neurosurgical and maxillo-facial cases. Special depots were provided to care for convalescents and for those who were lightly wounded and to ensure that they were soon fit to return to duty.

The general health of the troops and their standard of hygiene remained good throughout the campaign. This was due at least in part to the improved education of all ranks and to the better understanding by all of the problems involved.

Food-supplies in France and Belgium

Mr. T. E. **Harvey** asked the parliamentary secretary to the Ministry of Economic Warfare whether he was now able to give further information as to the food situation in Belgium and France, and in particular as to the adequacy of the food available for young children.—Mr. **Dingle Foot** replied : The average weekly rations of the principal foodstuffs have remained unchanged in Belgium since my answer to Mr. Wilfrid Roberts on April 22, but the weekly ration of miscellaneous cereal foods, including roasted barley, pulses and other cereal products has been reduced from 197 to 1[illegible] grammes. On the other hand, there has been a [illegible] improvement in the supply of herrings. In France, also there has been no change in the official rations for the wh country, though there have been certain local and apparentl temporary cuts in the bread rations in certain departmen Recent reports further suggest that shortage of meat vegetables in certain southern departments have bee accentuated. Generally speaking, these changes affect young children along with other classes of the population. There has, however, been no change in the special milk allowances for children and nursing mothers, while milk-supplies naturally tend to improve in the summer months.

Replying further, Mr. **Foot** said that the rations of milk were fully available in the case of children under thre[illegible] age and nursing mothers, but sometimes rations [illegible] forthcoming in the case of children over three years of age.

Anti-Vaccination Propaganda

Viscount **Hinchingbrooke** asked the Minister of Healt whether he was aware that the National Anti-Vaccinatio League was circulating literature to expectant and nursing mothers advocating a course of action with regard to vaccina tion and diphtheria immunisation contrary to the declared policy of his department ; and whether he had any statement to make.—Mr. E. **Brown** replied : Yes. I am of opinion that they are best countered by effective and positive action The ministry and local authorities are therefore continuin propaganda to advise parents to have their children protecte by methods supported by the best medical opinion.

Does the Minister consider it is right and proper for women in this condition to be subject to a barrage of conflicting views ?—I think that on the whole the conflicting views have helped to bring the truth home to them.

INFECTIOUS DISEASE IN ENGLAND AND WALES

WEEK ENDED JUNE 19

Notifications.—The following cases of infectious disease were notified during the week : smallpox, 0 ; scarlet fever, 1686 ; whooping-cough, 1918 ; diphtheria, 540 ; paratyphoid, 12 ; typhoid, 7 ; measles [illegible] rubella), 6472 ; pneumonia (primary or [illegible] 587 ; puerperal pyrexia, 154 ; cerebrospinal fever, 59 ; poliomyelitis, 5 ; polio-encephalitis, 0 ; [illegible] lethargica, 2 ; dysentery, 164 ; ophthalmia [illegible] 97. No case of cholera, plague or typhus fever wa notified during the week.

The number of civilian and service sick in the Infectious Hospita of the London County Council on June 16 was 1769. During th previous week the following cases were admitted : scarlet fever 143 ; diphtheria, 35 ; measles, 66 ; whooping-cough, 27.

Deaths.—In 126 great towns there were no deaths from enteric fever or scarlet fever, 1 (0) from measles 7 (2) from whooping-cough, 10 (1) from diphtheria, 5[illegible] (13) from diarrhœa and enteritis under two years, and 13 (0) from influenza. The figures in parentheses ar those for London itself.

Of the deaths from diarrhœa 7 occurred in Birmingham, 5 i Manchester and 3 in Bristol.

The number of stillbirths notified during the week wa 208 (corresponding to a rate of 29 per thousand tota births), including 22 in London.

Epsom College.—At the annual general meeting held June 18, Lord Leverhulme, the president, said he was sympathy with widening the basis of entry into public scho but not with making all education uniform. That wo only result in a levelling down instead of up. He confident that independent schools like Epsom College w play a distinctive part in postwar education. He cong lated the council on having reduced the deficit on the w account from £4800 to £1500, a result which would h been impossible without the willing coöperation of the The council of the British Medical Association, in addi to contributing generous donations, had handed over to Royal Medical Foundation half of a legacy of some £7 from the late Dr. T. Connell Craig, to establish a C Craig fund for the alleviation of distress.

Letters to the Editor

FUNCTIONAL DISEASE OF RECTUM AND COLON

SIR,—The joint discussion at the Royal Society of Medicine (reported in your issue of June 19) clearly showed the value of interchange of opinions gained in various spheres of clinical experience. The physicians threw out the challenge of "rehabilitation" in rectal diseases. The surgeon is prone to rest content in removing the painful or disabling rectal lesion, but allows the patient to continue the aperient habit which he has acquired in his efforts to obtain an easy remedy. Natural bowel rhythm is then never restored. The psychiatrists also pleaded for rehabilitation in the sphere of the personality. In their experience diseases of the rectum and colon and disorders of defæcation unmask fear and self-centredness which may become fixed. They counselled the surgeons and physicians to listen sympathetically to the patient's attitude and views of his trouble, and to rehabilitate the mind of the sufferer to peace and to an outgoing purpose. Doctors who saw the amount of distress to the mind and the concealed handicaps to the vocational life caused by difficulties in defæcation would give time and encouragement to their patients to speak openly about their troubles. They would then give

Failure in habit and inattention to the defæcation reflex forced the rectum to play this—its unnatural—part.

Individual responsibility entered largely into the mechanism in establishing a daily morning after-breakfast attempt to defæcate. If daily success were not attained, fears and anxieties should not be allowed to creep in. Another mechanism still remained to safeguard normal function: the "*call to stool*" or *defæcation* reflex. This arose when fæces entered into the rectum, but it was second best and if unheeded easily lost its edge. For starting and completing defæcation time was essential. The personal discipline for this was wanting in the

unt and the
esponsibility
comfortable
The scope and importance of the subject discussed can be grasped when it is realised how much the happiness and effectiveness of 12 million people of these isles may depend on completeness of emptying the bowel each morning. More harm is done to the mind and vocation than to the body by imperfection of

It was clear that of the
bowel function—the strai
response to the conscious c
—only the first gave satisfactory emptying of the bowel and satisfaction of the mind. The other two carried with them the sense of incompleteness of function and dissatisfaction.

Harley Street, W.1. E. T. C. MILLIGAN.

STERILITY

SIR,—In the management of a case of sterility—or
ried couple who desire children,
how far the two statements are
ys a problem to decide how far
pursued.

Your editorial of May 8 did good service in insisting hat if a sperm examination is to be made it must be done horoughly and with regard for all the complicated actors of seminal chemistry and sperm morphology; and no-one would dispute the need for such an examination in any planned scientific study of human sterility. On the other hand, in routine clinical practice there are definite objections to doing routine examinations of the emen. The main one is that in the vast majority of ases the semen is reported as normal and all the onus or the infertility is thrown on the woman, at all events n the minds of the two people directly concerned. Childless couples have already a difficult enough problem o solve if they are to make a success of their marriage, nd it is unfair to make things more difficult still by llocating the responsibility to one partner. The woman is handicapped by the fact that the ovum can only be demonstrated by inference.

All that is called for in most of these cases is the demonstration that the passages are patent. It would of course be another matter entirely if more precise investigations led to precise treatment, but unfortunately at the moment this is not the case. The criticism may be raised that this subjects the woman to an unnecessary examination. The answer is that very few women object, that in no other way can the assurance of normality be given, and that the insufflation or injection of iodised oil has a definite therapeutic value.

Other objections could be raised as to the validity of semen analysis. That it is crude is evidenced by the fact that the result is expressed as a percentage of normal sperms. Since only one is needed (vide Aldous Huxley's poem), it would appear that even such a low count as 20% would leave plenty over. Of course I am aware that the proportion of normal sperms seen under the microscope is used only as an index, but the fact that such a crude index is necessary clearly shows that much sperm morphology is still far from clear.

On another point I am not completely sure of my ground, but I have the impression that a lot of our beliefs about human sperm morphology are derived from the findings in animals, notably horses, in which the position is complicated by the occurrence of abortion-producing viruses transmitted by the semen and damaging some of the sperms. As yet there has been no suggestion that these occur in man.

Liverpool. PERCY MALPAS.

INCREASED CAPILLARY PERMEABILITY IN SHOCK

SIR,—In your annotation of June 10 you say that Page and Abell "note that no evidence was found of

with the conclusions of the authors, who write: "It is, of course, quite possible that some increase in permeability may have occurred short of that necessary to cause crowding together of erythrocytes" (their only criterion of ICP) "but no-evidence either for or against this possibility was secured."

The rôle of ICP in shock could be established by: (1) determining the plasma-protein level, which should
decrease during shoc
genesis; (2) detern
which should show a
(3) direct observation of ICP—e.g., by the passage of fluorescein through the capillary wall, which occurs only during ICP.

Chester Beatty Research Institute, S.W.3. BRUNO SCHOBER.

DOCTORS AND THE FUTURE

SIR,—If to stand first on one leg and then on the other is your usual mode of progression, I am worried about the state of your spinal cord. I tried it in the hospital corridor, but stopped quickly when I saw the expression on the face of our neurologist who unfortun-

ment"? Even my old friend Dr. Jackson, who ought to know me better, seems suspicious of my motives.
May
schen
I sat,
to us
away
Study Group of the BMA and with very few alterations by the local division. This, and its strong family resemblance to other schemes more recently published, are my reasons for thinking that it would be generally acceptable.

The country is divided into regions, as suggested by

it are a number of smaller hospitals, with equipment equally modern, but without a medical school and with fewer specialties represented, staffed partly by whole-time specialists and partly by local GPs as assistant physicians and surgeons. Each of these second-grade hospitals has under its wing the neighbouring health centres. The health centres are not the robot institutions pictured by many correspondents in the medical press. They are convenient buildings in which the neighbouring GPs will have their consulting-rooms, complete with such modern medical necessities as dispensers, nurses and secretaries. Domiciliary practice continues as it is today. These three grades of institution are governed by their medical staffs, strengthened in the case of the hospitals by representatives of the patients.

All the medical services, including public health, in a region are coordinated by a regional committee which consists of elected representatives of the doctors of all kinds and of other relevant groups including local governments. Medical members should be a powerful minority. Medical officers of health are employed by the Regional Committee and not by local governments.

At the head of the Regional Committees is the National Board of Health. The chairman is a layman and a cabinet minister, called if you like the Minister of Health. Some of the members are laymen, appointed by the Privy Council; some are ex-officio (for instance, the presidents of the Royal Colleges); the remainder are the chairmen of a number of consultative committees. These consultative committees (General Practice, Hospital, Public Health, Medical Education, Propaganda, &c.) consist of practising doctors elected by their peers on a regional basis. The members are part-time and well paid and are re-elected (or not) every five years. They are subjected, during their terms of office, to the continual criticism of their constituents in clubs and pubs and hospitals and are unable to shelter themselves behind that thick cloak of anonymity which today enshrouds the civil servant. They know, through their chairman, what goes on in the National Board of Health, and they pass on the information to those whom they represent. They control the civil servants who do the day-to-day administration and are not controlled by them.

The National Board of Health is directly controlled by Parliament, in fact by the people, and this is the anwer to your criticism. Neither the local grocer nor the shadowy civil servant controls our doings. Through Parliament at our head, through the lay members of the National Board and Regional and Hospital Committees, our patients have the ultimate rule and final voice. But in technical matters and in our daily life we retain our personal responsibility and the dignity of a learned profession.

Whitchurch, Bucks. RAYMOND GREENE.

CERTIFICATION AND STATE SERVICE

SIR,—Though not an enthusiast for a state medical service as something intrinsically desirable, I cannot see how a Beveridge plan is possible without one. And I am inclined to think that if Sir William Beveridge were "put to the question" under 'Pentothal sodium' he would confess to the same conviction.

No man can serve two masters. The state must have accurate disinterested certification of unfitness for work and it must have the most rapid possible return to fitness to work. Hence the rehabilitation centres.

Now, in unalloyed private practice the patient's wishes are paramount. He may not wish for an accurate—perhaps brutally accurate—diagnosis. He may not be in a hurry to get well, and he usually wants a say in how he is to be made well. Very often he secretly or openly wants his doctor for a friend, confidant and even father-confessor. He likes to feel that if his wishes are not met he can change his doctor. If he pays for his doctor and for the expenses of his illness, he is probably right to demand this sort of service, and the doctor is content to supply it; even if he sometimes rebels inwardly at his slightly servile condition. As long as Free Choice of Doctor is retained, so long will the patient expect and obtain a friendly, complaisant, slightly servile medical man. I leave you to guess how long it would take a "free" medical profession to bankrupt the Beveridge.

As to regional medical officers supervising certification, I feel sure from experience that it would fail. They will not take the responsibility of certifying that a man is fit, and I don't blame them. It is one of the most difficult tasks in medicine, and you have to know the patient and his circumstances well to come to the right conclusion. General practitioners are good at it, but it does not pay them to use their skill.

Also it would be very humiliating for general practitioners to be supervised and overridden by certification officials, supposing you could recruit good men for such a dull job. No, far better free GPs from their servile condition, and then they would soon deal with scrimshankers and prevent the terrifying output of neurotics. They would be more efficient and make fewer mistakes than specialists and consultants. Remember! It was not GPs who invented the effort syndrome—that answer to the neurotic's prayer.

The fact is, the amount of neurotic illness is already great. Of all ætiological factors concerned in this disorder in peace-time, I should put Freedom from Want first, and next in order I should put a servile medical profession. A "free" medical profession plus the Beveridge plan would populate England with a multitude of neurotic, spineless pension and dole gatherers.

Bridlington. P. D. H. CHAPMAN.

THE NURSE WITH TUBERCLE

SIR,—When I was a patient in a sanatorium I could not help but be struck by the apparently high incidence of tuberculosis in nurses. This led me to undertake, later, some careful investigations and I have made notes on the working capacity and financial position of 59 tuberculous nurses with whom I have been in touch. Of this small personal series:—8 have died; 18 are ill at home or in sanatoriums; 4 have returned to work at their own hospitals; 13 are nursing in sanatoriums; 8 are at home, fairly well but not working, and 2 of these have married; 1 is working at civil defence; 7 I have not been able to trace and I think it likely that 3 of these have died. I have no definite information about the financial position of many of them, but I know 15 (4 of whom have since died) were in economic difficulty serious enough to affect their health unfavourably. Thus 7 had no income at all, 2 only NHI benefit (15*s.* weekly) and 4 a proportion of total disablement benefit amounting in one case to 2*s.* a week, in another 2*s.* 6*d.*, in another 3*s.* 6*d.* and another 6*s.* Approved societies have the right to withhold a part of benefit until the patient is discharged from hospital; I know of one nurse whose condition was hopeless over whom the society exercised this right: she subsisted on 3*s.* 6*d.* a week for the last 5 years of her life, being given the shelter of a sanatorium. When she died £25 had accumulated and the society advertised to try to find the next of kin.

I am not myself a nurse but I am interested in the conditions under which nurses work.

Fulham, S.W.6. E. D. ANDREWS.

TREATMENT OF OSTEOCLASTOMA

SIR,—I hesitate to criticise Dr. Brailsford, for all of u who have much to do with bone pathology owe him a great debt. Nevertheless, one feels that a scientifi paper based on case-reports should be so presented tha the conclusions in the discussion are adequately supporte by the cases dealt with. Dr. Brailsford describes fiv cases, of which nos. 3 and 4 were not osteoclastomat but were examples of chondrosarcoma. Case 2, whic was also stated to be radiologically typical of osteoclastoma, has no report on the histological findings of th material removed at operation. Case 5 had no operatio at all, so that though "the radiogram showed a typic osteoclastoma" we have no knowledge that it was, i fact, of this type.

I do not think Dr. Brailsford has given satisfactor scientific reason for believing that "the diagnosis can b established by radiography, and biopsy is neither necessary nor desirable"; nor for the statement that th treatment of choice, whatever the site, is X radiatio He may be right, but one would like to have bett evidence in support of his views.

Exeter. NORMAN CAPENER.

Obituary

G. H. LAWSON WHALE

M D CAMB, F R C S

Mr. Lawson Whale, surgeon for diseases of the ear, throat and nose to the National Temperance and North-Western Hospitals, died at his home in St. John's Wood on June 21. Born at Woolwich in 1870 he was educated at Bradfield and Jesus College, Cambridge, qualifying in 1902 from St. Bartholomew's Hospital. After serving there as house-physician he entered the Indian Medical Service, but was soon invalided home with sprue, using this experience for his MD thesis. On recovering from this knockout he trained for the surgical fellowship and mastered the specialty to which he devoted the rest of his life. Holding a commission in the RAMC (T) he gained the Mons Star in 1914 and for the next four years was surgeon-specialist to the 53rd General Hospital. Here, with Dundas-Grant, he saw many gunshot wounds of the face and neck, and together they developed the early work in plastic reconstruction begun at the Val-de-Grâce. On these injuries he wrote more than one book in the conversational and pleasantly aggressive style that always gained him audience. A more recent book in a modern treatment series (1930) gave the practitioner in small compass a stimulating view of present opinion and practice.

Whatever Whale set his hand to do he did with his might. At Cambridge it was tennis, where he won the colours of the Grasshoppers; later it was yachting or golf or (when these failed) fishing; always he was striving to learn all he could, in his profession and outside. His hospital work—and in his time he worked at many—was done with enthusiasm and devotion. In early days his presence at a medical committee implied a certain liveliness in its proceedings, but he was a courteous fighter and spared the feelings if not the arguments of his opponents. And so it was that the painful illness of his later years, resented for its physical limitations, was mitigated by the ties of friendship.

AUGUSTE BOYES

M B GLASG

Dr. Auguste Boyes, who died at her home in Dundee on [illegible]
[illegible] ghter of Thomas
[illegible] graduated MB in
[illegible] esident medical
[illegible] ryfield Hospital,
[illegible] officer in Shrop-
[illegible] urned to Dundee in 1919 to
[illegible] who was retiring from private
[illegible] a keen interest in the clinical
[illegible] medicine, and was a member
[illegible] he panel
[illegible] y clinic.
[illegible] Dundee
[illegible] or the Red Cross Society.
[illegible] the Soroptimist Club, the
[illegible] the Dundee Art Society,
the League of Nations Union and the Orchestral Society.

EDWARD HENRY HARTE

M B DUBL, D P H

Edward Harte, deputy medical officer of health for Harrogate, who died recently was a man of strong character. A slowly progressive illness "accidentally [illegible]

[illegible] successful with children and their mothers, and to administrative problems he brought a sane common sense. He saw fun in everything, and his quickness of phrase and richness of expression was astonishing. We never once heard him complain of his illness, indeed he rather liked to joke about it and when he got a retinal hæmorrhage he laughed and said his senior colleague "had bought a pup." Reading was his main relaxation but he had played a good game of golf, and was also a keen bird watcher. He leaves a widow.

Notes and News

SURVEYORS OF HOSPITAL SERVICES

SURVEYS of the hospital services are now in progress throughout Great Britain and Northern Ireland, on behalf of the Ministry of Health, the Department of Health for Scotland, and the Northern Ireland Regional Hospitals Council. Both voluntary hospitals and local authority hospitals are being surveyed, but not (except in Northern Ireland) institutions for mental disorder or mental deficiency. The surveyors are:—

APPOINTED BY THE MINISTRY OF HEALTH

London (including Kent, Surrey, Sussex, Middlesex, Essex, Hertfordshire, Bedfordshire, Hampshire and Dorset).—Dr. A. M. H. Gray, Dr. Andrew Topping.

North-west and North Wales.—Mr. E. Rock Carling, FRCS, Dr. T. S. McIntosh.

BY THE WELSH BOARD OF HEALTH

South Wales and Monmouthshire.—Prof. J. A. Nixon, FRCP, Prof. R. M. F. Picken, MB, Dr. A. Trevor Jones.

BY THE NUFFIELD PROVINCIAL HOSPITALS TRUST

North-east.—Sir Hugh Lett, FRCS, Dr. A. E. Quine.

Yorkshire.—Sir Herbert Eason, FRCS, Dr. R. Veitch Clark, Mr. W. H. Harper.

East.—Sir William Savage, MD, Mr. C. H. S. Frankau, FRCS, Sir Basil Gibson.

Birmingham and West Midlands.—Mr. J. B. Hunter, FRCS, Dr. Veitch Clark, Sir Ernest Hart.

Berks, Bucks and Oxon.—Prof. G. E. Gask, FRCS, Prof. R. H. Parry, FRCP, Mr. E. C. Bevers, FRCS.

Sheffield and East Midlands.—Prof. L. G. Parsons, FRCP, Dr. G. E. Godber, Mr. S. Clayton Fryers.

South-west.—Mr. V. Z. Cope, FRCS, Dr. W. J. Gill, Mr. A. H. Griffiths.

Northern Ireland.—Lieut.-General Sir William MacArthur, FRCP, Dr. Stanley Barnes, Dr. Duncan Leys.

BY THE DEPARTMENT OF HEALTH FOR SCOTLAND

[illegible] C. F. W.
[illegible] RCSE, and
Dr. H. E. Seiler.

East and North-east.—Prof. R. S. Aitken, FRCP, and Dr. H. Hyslop Thomson.

RADIOLOGISTS' BRAINS TRUST

THE Yorkshire Tuberculosis Society, after temporary loss of function at the beginning of the war, has now regained full activity, and an interesting feature of its recent session has been a Radiologists' Brains Trust. At the first meeting of this kind, members of the society provided films—to which questions were attached, with or without clinical details—and the brains trust (Major Peter Kerley, Dr. A. S. Johnstone and Dr. A. Pollitt) provided the answers. At the return meeting, the [illegible] ms, *without* clinical data, for the [illegible] a merry time was had by all. [illegible] e drawn from these experiments, and these, it is hoped, will be defined by further trials of strength between the two protagonists. There is no doubt about the benefits accruing, because all members can participate; and the idea may appeal to other societies, not only in the tuberculosis world.

LABORATORY ANIMALS

THE Universities Federation for Animal Welfare has found that workers engaged in animal experiments are anxious to pool their experience so that they can spare the feelings of the animals. To help matters on, the federation has already sent to 130 laboratories, on request, copies of Prof. J. G. Wright's *Veterinary Anæsthesia*. Members of the federation are now compiling information about anæsthesia of rats, rabbits, guineapigs and other animals not covered by this work; methods of killing laboratory animals; living conditions, housing and diet. The breeding of such animals, they feel, should probably be in the hands of trained personnel. A small number of experienced laboratory workers are being invited to act as a panel to approve and amend their compilation. Any of our readers who can offer views or suggestions are asked to send them to Dr. F. Jean Vinter, secretary of the UFAW, at 284, Regent's Park Road, London, N.3.

University of Cambridge

At recent examinations the following were successful:

FINAL EXAMINATION FOR MB

Part I: Surgery.—D. Ainslie, J. Attenborough, A. S. Ba[illegible] B. Bennett, J. H. E. Bergin, V. L. Billi[illegible] C. Burne, K. Chitty, M. H. Clement, W. R. Cole, M. L. Cox, R. A. D. Crawford, F. A. L. da Cunha, P. J. de Vescovi, G. H. P. Drake, H. L. English, A. M. H. Fisher, M. R. Geake, K. O. George, R. V. Gibson, A. J. Gray, J. A. Hallinan, G. Hildick-Smith, R. F. Hobson, G. M. Homan, M. C. Hudson Bennett, W. N. Ingham, I. S. King, J. A. Loveless, J. B. Lyon, R. S. Mitchison, H. A. B. Nicholls, T. Norman, R. G. F. Parker, A. N. Pearson, R. A. Peebles Brown, W. R. Probert, B. O. Reed, B. W. Rhodes, M. H. Russell, M. Sidgwick, E. S. O. Smith, P. S. Smith, D. H. K. Soltau, P. G. Somerville, I. S. Staddon, P. R. Swyer, P. Venables, D. Vérel, M. M. Walker, J. Wedgwood, D. B. B. Whitehouse, H. B. Whitmore, A. J. W. Woodroffe.

University of London

On June 23 the senate re-elected Prof. Frank Horton, FRS, vice-chancellor, and Prof. D. Hughes Parry, deputy vice-chancellor, for 1943–44.

The title of professor emeritus of the history of medicine in the university was conferred on Dr. Charles Singer on his retirement from the chair of the history of medicine at University College.

The additional MB, BS examination to be held in 1944 will begin on Jan. 31.

The degree of DSc has been conferred on Miss Emmy Klieneberger, of the Lister Institute, Mr. W. T. Russell, of the London School of Hygiene and Tropical Medicine, and Mr. T. E. Wallis, of the college of the Pharmaceutical Society.

Nuffield Provincial Hospitals Trust

At a council meeting in Cambridge on June 18 reference was made to the hospital surveys mentioned on p. 31. Suggestions were considered for the establishment of group preliminary training schools for nurses, and these were approved in principle. It was reported that, with the financial assistance of the trust, regional health and sickness bureaus have been established in the Berks, Bucks and Oxon and the Glasgow areas. It it hoped that the former may be accommodated in the Institute of Social Medicine in Oxford under the immediate direction of Prof. J. A. Ryle.

Tuberculosis Association

At a meeting to be held at Oxford from July 8 to 10, Prof. John Ryle will give an opening address on tuberculosis as a social disease. Subjects of discussion will include extrapleural pneumothorax, tracheobronchial tuberculosis, and the differential diagnosis between pulmonary tuberculosis and atypical pneumonia. The hon. secretaries are Dr. Norman England, Dr. N. L. Rusby and Dr. J. V. Hurford.

Industrial Medicine at Bristol and Sheffield

A course will be held at the *University of Bristol* on Saturday and Sunday, July 10 and 11, in cooperation with the Association of Industrial Medical Officers. The syllabus includes a visit to a factory and the following lectures: Mr. T. Bedford, D SC, heating and ventilation; Mr. R. Tugman, protective clothing and appliances; Dr. Donald Stewart, health surveys in factories; Mr. W. Sayle Creer, FRCS, foot faults in relation to form and function. The fee for the course is one guinea and applications should be sent to the dean of the faculty of medicine not later than July 7.

The third series of short postgraduate courses arranged by the faculty of medicine of the *University of Sheffield* is taking up two week-ends, beginning on Friday at 2 PM and ending at noon on Sunday, including in each case a visit to a factory. Special attention is being paid to problems of labour management, to education of young workers, and to vocational selection. During the second course, July 16–18, Dr. E. Fretson Skinner will deal with psychological stresses in industry; Dr. E. R. A. Merewether with the medical officer's approach to the factory, and Dr. W. J. Rees will demonstrate the sources of silicosis risks. Mr. A. H. Dodd will show some simple works tests for atmospheric pollution, and there will also be an exhibit of eye protection apparatus arranged by the Northern Counties Association for the Blind. On Friday the factory visited will be an old-established glass-making works at Rotherham. On Sunday, Mr. T. W. McCullough will lecture on industrial accidents, and Dr. J. L. A. Grout on injuries to bones and difficulties in interpretation of radiograms. The course is limited to 40 and reference should be made to the Dean of the F[illegible]y of Medicine, The University, Western Bank, Sheffield,

University of Glasgow

On June 25 the degree of MD was conferred on Archibald Dick (with high commendation) and Hugh Stewart.

Medical Casualties

The following casualties among RAMC officers have been announced:

Killed in action.—Captain A. O. Karstaedt, MB LPOOL.

Wounded.—Lieutenant F. K. Crittenden, MRCS; Captain G. D. McIntosh, MC, MB EDIN.; Captain J. M. McKiddie, MB ABERD.; Captain G. D. Park, MB GLASG.; and Captain W. F. White, MB GLASG.

A SPANISH-ENGLISH MEDICAL VOCABULARY.—Mr. M. G. MCELLIGOTT, FRCSI, writes from Heathwood, Bushey Heath, Herts, that he has compiled a Spanish-English medical vocabulary which has been examined and approved by a Spanish surgeon of distinction. Before the work goes to press he would welcome suggestions from Spanish-speaking doctors how to make it most useful for ready reference.

VITAMIN-C SUBNUTRITION IN GINGIVO-STOMATITIS.—The paper with this title appearing in our issue of May 22 (p. 640) described investigations by Lieut. F. Stuhl carried out between November, 1941, and March 1942. The author at that time did not hold a commission in the RAMC, and our heading of the paper ought not to have mentioned his present military status. Though formally submitted to the War Office, the article was not subject to the usual military censorship; and we are asked to point out that the views expressed in it are not necessarily those of the Army Medical Department.

ESTIMATION OF SERUM BILIRUBIN AND SULPHANILAMIDE.—The last two lines of the third paragraph of Rappaport and Eichhorn's paper on this subject (*Lancet*, 1943, i, 62) should read: "To prepare the fresh reagent mix 10 c.cm. of diazo 1 with 0·6 c.cm. of diazo 2" (*not* "2·0 c.cm. of diazo 2").

Appointments

EDDY, G. S., MB BELF.: deputy medical superintendent at Yardley Green Road Sanatorium, Birmingham.

GLASS, MARGARET, B SC, MB GLASG., DPH: temp. MOH for Southall.

HIRSCH, MAX, MD BERLIN: temp. asst. MO for Northamptonshire and RMO at St. John's Emergency Maternity Home, Northampton.

LEA, D. E., PH D: advisory physicist to the radiotherapeutic centre at Addenbrooke's Hospital, Cambridge.

MACDONALD, F. G., MRCS, DPH: director of VD clinic at Queen Mary's Hospital for the East End, London.

OLMSTEAD, G. ALLISON, MB EDIN.: RSO at Worcester Royal Infirmary.

Births, Marriages and Deaths

BIRTHS

BROWNE.—On June 20, at Oxford, the wife of Flight-Lieutenant R. C. Browne, MRCP—a son.

CHARLES.—On June 4, at Bournemouth, the wife of Major Gilbert Charles RAMC—a son.

HARMER.—On June 24, the wife of Mr. Michael Harmer, FRCS—a son.

HAY.—On June 6, at Newcastle-on-Tyne, the wife of R. K. Hay, MB, lieutenant RAMC—a daughter.

HOPKINS.—On June 20, at East Malling, Kent, the wife of Surgeon Commander W. A. Hopkins, RN—a son.

HUGHES.—On June 15, at Woking, the wife of Lieutenant Stephen Hughes, RAMC—a son.

KERR.—On June 8, at Cairo, the wife of Captain John Guthrie Kerr, RAMC—a son.

SCOTT.—On June 8, the wife of Dr. R. H. Scott, of Hook, Hants—twins.

SIDDONS.—On June 25, in London, the wife of A. H. M. Siddons, M CHIR, squadron-leader RAFVR—a son.

YARRED.—On June 19, at Godalming, Surrey, the wife of Lieutenant Harwood Yarred, RAMC—a daughter.

MARRIAGES

COCHRANE—HASLOP.—On June 19, Herbert Lees Cochrane, FRCS, to Sheila Haslop, MRCS.

LAUBER—WERTHEIMER.—On June 26, in London, Henry K. J. Lauber, MD, to Erica Jenny Wertheimer.

WILEY—CHANEY.—On June 12 at Wimbledon, William Verner Caldwell Wiley, MB, to Jean Chaney.

DEATHS

BURTON.—On June 21, at Cheltenham, Edward Theodore Burton, MRCS, surgeon captain, RN, retd.

LEATHEM.—On June 24, at Sanderstead, Alfred Newman Leathem, MRCS.

TYLER.—On June 21, in London, Margaret Lucy Tyler, MD BRUX., LRCPE.

VICKERS.—On June 19, at North Stoke, Oxfd, Norman Bremer Vickers, surgeon lieutenant commander, RN, retd.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.

SENSORY AREAS OF THE BRAIN*

E. D. ADRIAN, OM, MD CAMB, DSC, FRCP, FRS
PROFESSOR OF PHYSIOLOGY IN THE UNIVERSITY OF CAMBRIDGE

THIS lecture bears the name of one of the classical figures in British physiology. Edward Sharpey-Schafer belongs to the great period. It is not so many years since he was in full activity in the chair in Edinburgh, but he began his work when in the whole English-speaking world there was only one properly equipped laboratory of experimental physiology. He was one of the 35 original members of the physiological society along with men like Huxley, Galton, Ferrier and Michael Foster, though he lived to see the time when his subject had become so enlarged that it was already in danger of breaking into a dozen subdivisions. Throughout this long career he was in the first rank, as an investigator, a teacher and a leader in new developments.

He was at the height of his activity when I was a medical student and my introduction to him was like that of most medical students before and since—through buying a second-hand copy of his *Essentials of Histology.* The authors of the textbooks we use as students must always seem a little more than life-size, and to most of my generation Schafer and Starling and Halliburton are

the most attractive branch of science in the latter half of the nineteenth century, when the sciences of the non-living seemed to have no fresh worlds to conquer

much difficulty in relating his theme to Sharpey-Schafer's own researches for there were few subjects in physiology which did not come within his range. His most remarkable discovery is that made with Oliver on the pressor effects of the suprarenal gland, but his name is most widely known as the author of what is still the best method of artificial respiration. Neurology was far from being his main interest, yet his observations on the spinal cord and on the visual area of the brain played an important part in developing our present

of us nowadays.

This lecture deals with a topic to which he returned many times—the sensory areas of the brain. New methods have come since his time and have given us a wider range of observation. They have removed a certain amount of obscurity and revealed a good deal more, but they seem a fitting subject for the commemoration of one who was a born experimenter and was always ready to welcome a new technique.

METHODS OF STUDYING THE BRAIN

the

pa injury or operation on the brain; and (*c*) the study of the effects of electrical stimulation of the motor area. Sharpey-Schafer used all three of these, but not the fourth which we can add nowadays: the study of the electrical changes taking place in the brain when messages arrive there and nerve-cells become active. The idea under-

for

by

electrical effects, a minute flow of current towards the active part of the cell surface. These electrical effects had been used most fruitfully for analysing the process of nervous conduction, but very little use could be made of them in the central nervous system until the advent of the valve amplifier. They can now be magnified to any extent so that the nervous messages can be traced throughout their passage up to the cerebral cortex and we are limited only by the very complex structures in which they operate.

THE VISUAL CORTEX

One kind of information which is most readily obtained by the use of electrical technique is the detailed mapping of the afferent projection areas, the regions of the cerebral cortex which act as receiving centres for incoming messages from the sense organs.

ical

by

an entirely different method. Much valuable work on these lines has been recently done at the Johns Hopkins Medical School. A good example is that of the visual area: when a light is shone in the eye, although the animal is deeply anæsthetised, there is an immediate electric response in the striate area of the cortex and not

hrown on

the brain

auses the

rea which

the retina. By exploring the visual system in this way Marshall and Talbot[1] have shown how the different parts of the visual field are projected on the brain in different animals. Though the map varies for different species the arrangement in the cortex always bears a simple relation to that in the eye. There is some distortion and editing: in the monkey for instance a large part of the cortical receiving-area is connected with the macula and very little with the periphery, but the picture is easily recognisable in spite of the distortion.

I have mentioned the visual part of the brain first because it is the only region in which we can get similar evidence from man without going to the length of opening the skull. If we could apply electrodes to the exposed cortex there is no reason why we should not map out all the receiving areas in man as we can in animals; but with the skull and scalp intervening we can only detect electrical activity when large numbers of nerve-cells are working in unison. In the visual area we can

ring

in

occipital part of the head.

te of flicker is reproduced in

as well by the brain as by

changes in the rate are reflected in the cerebral record (fig. 1). From this we can say that in man the cerebral pattern reproduces at least one aspect of the retinal—namely, the pattern in time. We cannot say that it reproduces the picture in space as well as in time since we cannot examine restricted areas of the cortex: and indeed

association areas. How much this overflow takes place varies a good deal from one subject to another.

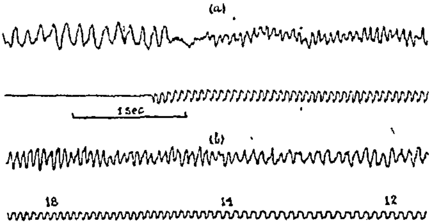

Fig. 1—Electro-encephalograms
the effect of flickering light.
electric cell showing rate of fl
began. (b) Rate of flicker was
record follows it.

AUDITORY AND OLFACTORY AREAS

There is therefore a spatial and temporal pattern—a

—in the striate area

which confronts the

clear that sounds and smells are reproduced in the brain in the same terms, as changing pictures in the auditory and olfactory areas. Neither sounds nor smells appear to us to have any spatial quality but they are both detected by sense organs in which many thousand sensory nerve-endings are spread out over a considerable surface, and the quality of the sound or smell seems to be recognised by the particular pattern of excitation which it produces in the receiving area of the brain. In the cochlea for instance a deep tone will stimulate the endings near the apex and in the cat this leads to activity (shown electrically by Woolsey and Walzl[2]) in the posterior part of the auditory cortex. A complex tone will produce peaks and troughs of excitation in the cochlea and corresponding peaks and troughs of activity in the different parts of the auditory area of the cortex. A loud rhythmic noise, like a flickering light, might be expected to produce an electrical rhythm over the temporal area in man, but the auditory area is much smaller than the visual and its activities are extremely difficult to detect through the unopened skull.

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* The Sharpey-Schafer memorial lecture to the Faculty of Medicine, Edinburgh University, May 6, 1943.

Sounds therefore are pictured in the brain like sights. For smell the evidence is much less direct but it is highly probable that we distinguish one smell from another because of the pattern of activity in the olfactory cortex. Thus the outside world is represented in the brain at any moment by a visual, an auditory, or an olfactory picture, all in the same medium of nerve-cell activity. There is a fourth picture corresponding to the tactile stimulation of the body surface which is reproduced in the post-central region of the brain. Like the visual its spatial arrangements—the shapes of excitation in it—are easily recorded and obviously related to the spatial distribution of the stimuli. The arrangement in the monkey is shown in fig. 2.

SKIN SENSATION

In all these pictures in the brain there is evidence of a good deal of distortion or editing on the way from the sensory surface to the cortex and the nature of the distortion is interesting for it throws some light on the general functions which the brain has to perform. Clearly the headquarters of the whole nervous organisation does not want to be bothered with every scrap of information which the sense organs may collect—much of it would be concerned with visceral reflexes, adjustments of posture and so on. The cerebrum needs only the information which is likely to be important for the general plan of behaviour and this will be most of the information from the distance receptors, but from touch receptors only that from particular parts of the body surface. There is a striking diagram showing the area allotted in the human brain to different parts of the body in Penfield and Boldrey's[3] paper on the results of electrical stimulation. In it the legs and trunk occupy a relatively small part of the area, the finger and thumb a great deal and the lips and tongue also. Naturally the information from the touch receptors of the fingers and thumb will be much more important to the human brain than that from the trunk.

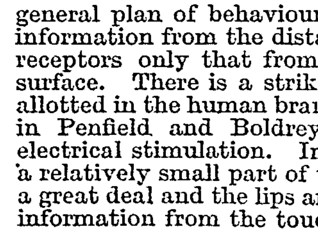

Fig. 3—Receiving areas in the cerebrum of the pig.

Now the forelimb is the important organ for tactile exploration in men and monkeys but not in other animals. It is worth looking therefore to see what parts of the body are represented in the sensory area in animals of different structure and habits. In the cat the arrangement does not differ much from that in the monkey. A fairly large part of the area is allotted to the forelimb and the digits and claws have a localised representation, though the area for the face is larger. But in the hoofed animals the limbs are used almost entirely for the semi-automatic movements of locomotion and very little information from them is needed by the cerebrum. It is the snout area which is used for tactile exploration and this has by far the most abundant connexion with the cortex. The best example of this in the animals I have examined is in the pig. Here the brain has large visual, auditory and somatic areas and the latter seems to be concerned entirely with sensory messages from the opposite half of the snout and upper lip (fig. 3). The snout is, of course, as important to the pig as our hands are to us. It is used for digging as well as for tactile exploration and it is mapped in the pig's brain on a scale quite equal to that on which the hand is mapped in man. In fact the pig's head is a good example of the concentration of essential apparatus in the leading segments—eyes, ears, nose, tactile apparatus, digging instrument and mouth.

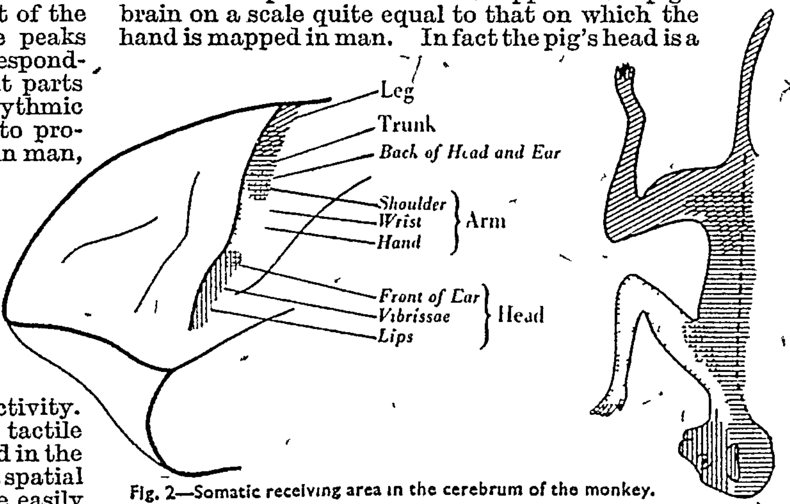

Fig. 2—Somatic receiving area in the cerebrum of the monkey.

In the sheep most of the body is buried under a thick fleece which keeps it from any contact with the outside world, and the legs, like those of the pig are used almost entirely for locomotion and posture. Consequently we should not expect to find much of the brain devoted to the signals from the body and limbs. Actually the important receptors, as far as the cerebrum is concerned, are those of the upper and lower lips and these have a representation almost as detailed as that of the pig's snout. A curious point is that in the goat and sheep the impulses for the lips go to the cortex on the same side instead of crossing the midline. This may be one of the features peculiar to ruminants, but the arrangement in the cow is still unknown.

One other hoofed animal must be mentioned, and that is the horse. One ought not to generalise from only two animals but in the only two examined the chief region sending tactile messages to the brain was not the lips, but the nostrils. This region is covered with thick hairs and is used for tactile exploration: moreover objects touched by the nostrils would be in the visual field so that the tactile and visual patterns could be integrated. From this fairly small part of the head surface the afferent supply is almost as abundant as from the pig's snout, and although the limbs have some representation the nostril area is clearly the most important. Incidentally the horse's brain is highly convoluted and has large silent areas though it is considerably smaller than ours.

If we compare these ungulate brains with those of typical carnivora the chief difference seems to be that in the latter there is a fairly detailed picture of most of the exposed parts of the body whereas in the hoofed animals the picture is mainly of snout or lips. This is natural as the carnivora use their limbs for fighting and capturing their prey and not merely for locomotion and posture. But even in them the face area occupies a large part of the cortical picture.

In most animals therefore the chief picture which is reproduced in the somatic area of the brain is a picture showing what is happening to the touch receptors in the region round the snout—the leading segment of the body. This must be added to the pictures corresponding to sights, sounds and smells: and its relative importance can be judged by the cortical area covered by it—somewhat larger than the auditory picture and smaller than the visual.

Now it is remarkable that in man there is still a fairly large-scale picture of the face area in the brain in spite of the fact that the head is no longer in front of the body and that the tactile receptors of the face are nothing like as important as those of the hand. Probably the arrangement reflects our past ancestry rather than our present needs: but it may well account for the fact that we are acutely conscious of and interested in faces, though it is true that we think of them in visual terms rather than tactile.

A good deal more remains to be done in the way of mapping these receiving-stations in the brain to find out just how the pattern of excitation of the sense organs is reproduced as a pattern of impulses arriving in the cortex. But it must be admitted that this sort of investigation does not tell us much about the actual mechanism of the cortex—about the way in which the picture is recognised when it occurs. In fact the results are simple and definite because the conditions are deliberately chosen to focus attention on the fixed pathways by which the different pictures are brought in. The chief condition is that the brain should be deeply anæsthetised so that the messages can still arrive there but cannot arouse the cortical nerve-cells. The sensory picture will then stand out clearly against a quiet background, whereas if the anæsthesia is light there will be a constantly changing activity to confuse the map.

THE NERVOUS BASIS OF PERCEPTION

So in recording these electrical patterns we are dealing with only the very beginning of the story as far as the brain is concerned. The arrival of a sensory message in the anæsthetised brain is like the ringing of a telephone bell in a house where all the inmates are asleep. Naturally we should like to go on with the story, to find out what happens when the nerve-cells are awake and can
atten
it an
want
brain when a familiar sensory picture appears and calls up associations and movements. Some entirely new method may be needed to get this information, but at least we can say that these electric waves from the brain do seem to be directly related to the actual sensations experienced by the subject. I have already mentioned the rhythmic electrical waves which can be recorded from the occipital region of the head when the eyes are illuminated by a flickering light. Now in certain conditions the subject has the impression that the rate of flicker suddenly slows down and becomes less definite. One can signal the moment when this occurs, with a little delay of course, and it is nearly always found that the change in sensation is reflected in a corresponding change in the rhythm of the electrical waves of the occipital area. This is, so far, the nearest approach we
have to record perception. It
is not a very n but it has the
merit of simpli for ending this
lecture with it of theories and
possibilities. That would have been how Sharpey-Schafer would have treated it, for he was before all things an experimental physiologist. He rarely worked under the inspiration of a guiding theory and did not spend much time on generalisations. There is no special doctrine to be associated with his name, but, instead, the long series of attacks made in the laboratory, some costly in time and energy and achieving little and some lucky and opening the way to a big advance. Work of this kind is not always appreciated at its full value since the generalisations may be made by someone else and it is the generalisations which are remembered. But there is little fear that Sharpey-Schafer's work will be forgotten. To be reminded of it we need only look
at the present fabric
of it he helped to buil
epitaph "Si monu
abundantly justified.

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FAMILY PLANNING CLINICS.—Referring to the brief report of the conference of branches of the Family Planning Associa-
loy Jackson
xeter clinic;
f the Royal
takes films,
opaque oil having first been injected on the X-ray table.

PULMONARY TUBERCLE IN CHILDREN

INFLUENCE OF EVACUATION ON ITS INCIDENCE

MARCIA HALL, M D CAMB, D C H
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THE increase of tuberculosis since the outbreak of the war seemed to justify collection and examination of the results of two years' work among tuberculous children in East Sussex in relation to the dissemination of the disease througl

A study of tuber-
culosis in childl done in
this country on child contacts of tuberculous cases.

Kayne (1937) quotes an investigation by Toussaint, tuberculosis officer of Bermondsey, into 54 families from each *of which a child had died of tuberculous meningitis. He* was able to find the source of infection in 86%. Investigation of contacts is also carried out at the Brompton Hospital contact clinic and they have established that among children of tuberculous parents the death-rate was three times greater than in children of non-tuberculous parents (Macpherson 1940). Apart from these instances there are no reports of widespread search for infected children until we turn to the work in other countries, notably Scandinavia and America.

ıburg, Sweden, has studied the
ın childhood fully and states
disease in that city has been
reduced by 51% in 33 years. This he largely attributes to intensive propaganda and search for contacts. In America, the *largest* centre of investigation is at the Lymanhurst Health Centre, Minneapolis; here they have shown that tuberculosis in young adults was more than five times as common in those who were positive to the tuberculin skin test during their childhood than in those who were negative (Johnson et al. 1940).

In Detroit a scheme for the care of tuberculous children reported by Chadwick (1933) has caused a drop in the mortality of 20% in 5 years. The scheme embodies the use of field nurses whose sole occupation is collecting contacts and following up cases.

Myers wrote in 1930 that through careful study of children *large numbers of unsuspected spreaders of bacilli can be* detected since infection quickly registers among children exposed to open cases. We have found this to be true; and also starting from cases of open phthisis we have by thorough investigation of all contacts discovered a large number of children with tuberculosis who would otherwise have passed unnoticed.

METHOD OF INVESTIGATION

History.—This was taken in each case, particularly the history of any past illnesses, such as measles and whooping-cough predisposing to chest infection; also of loss of weight, cough and ease of tiring. Secondly, of any known contact with tuberculosis or senile bronchitis.

Physical examination.—The examination of the chest seldom showed obvious physical signs, and most children with a primary complex had no signs at all. The commonest findings were a patchy diminution of air entry over one or other lung base with accompanying impairment of percussion note, or an area of fine crepitations round the lung roots; d'Espine's sign was positive in a fairly large number of cases. The physical examination included examination of the throat and skin to eliminate
reulosis for a raised blood-

Vollmer patch test (Lederle)
was used as a routine. The Mantoux test (intradermal injection of 1 in 1000 old tuberculin) was used in those few cases in whom the reliability of the patch test was subject to doubt.

X rays.—Routine
were taken; and in
a lateral view wa
appearances of earl
no means easy to interpret; often the shadows seen can be produced equally well by non-tuberculous processes, and the primary focus does not appear in the film until some time after infection has occurred. We found that many children in whom the radiographic appearances

were doubtful at first, developed calcification over a period of months.

Blood-sedimentation rate.—Dr. W. W. Payne's micromethod was used (normal, 3–10 mm. in the first hour). This test gives a good indication of the activity of the infection, provided other causes—such as sore throats or septic dermatitis, which also cause a rise in the rate—are not present.

Gastric lavage.—This was done on cases admitted to hospital. Three lavages on three successive mornings were performed and the three specimens were mixed before being sent to the laboratory for investigation for tubercle bacilli. This test is particularly valuable in children who swallow their sputum, and do not expectorate, and in whom, therefore, it is difficult to recover the bacillus and establish the diagnosis beyond doubt.

CASE-HISTORIES

Group I.—Cases illustrating the effect of billeting healthy children with others who have open tuberculosis.

CASE 1.—A girl, 12 years old, came to the pædiatric clinic held for evacuees, in August, 1940; she was sent as a case of rheumatism, but was found to have a cough which she had had for several months. It subsequently transpired that she had been examined in London on several occasions before evacuation, but tuberculosis had never been proved, and therefore no note had been sent to the tuberculosis officer of the reception area. Physical signs: cavities at both apices. X rays confirmed physical signs. BSR, 21 mm.; rose to 50 mm. later. Sputum loaded with tubercle bacilli. The child was admitted to Cuckfield Emergency Hospital and later transferred to a sanatorium.

School contacts.—All the children in her class were examined, together with their teachers. Of the children, 4 were found to be infected with tuberculosis—i.e., they had positive tuberculin skin tests (+++ or ++++)—and their X-ray films showed enlarged mediastinal glands; 2 more had a radiographic appearance which made it necessary to see them again, although their skin tests were negative and sedimentation-rates normal.

These 6 were re-examined in three months, and the whole group again in six months; those who then showed that their foci were not completely healed were seen once more, nine months after their original exposure. At the last examination the infected children were all found to have calcification developing in the primary foci and mediastinal glands. Positive skin reactions in 4 children out of 15 is not a very high percentage at this age and might be consistent with the findings in a school class not known to be recently exposed to tuberculous infection; but this only serves to emphasise how much greater is the danger of tuberculous disease when children are living in the house with others who have open tuberculosis.

Billet contacts.

CONTACT A.—A girl 6 years old. This child was admitted to Cuckfield Emergency Hospital in February, 1941, with a cough; she had previously been perfectly healthy. Physical signs: pleural effusion right base. X rays showed the effusion, but later, as this cleared, the primary complex appeared. Patch test ++. BSR 17 mm. Pleural fluid, clear, straw-coloured; 80% lymphocytes. The child was infected by case 1, who was billeted with the parents of case 2 from December, 1939, until July, 1940; the foster-mother had first noticed a cough in case 1, February, 1940.

Case 2 made a good recovery, and when last seen early this year was well and had healed calcified lesions in her right lung.

CONTACT B.—A girl 8 years old. Admitted to Cuckfield Emergency Hospital in January, 1941. Physical signs, on admission, were very few indeed, but the child looked ill and complained of abdominal pain. After two weeks moist sounds appeared in her chest, and she gradually developed signs of tuberculous meningitis. She died after three weeks. X rays showed miliary tuberculosis. BSR, 25 mm. Patch test, negative. CSF, cells 420 per c.cm.; protein 0·120 g per 100 c.cm.; chlorides 0·70 g.; sugar 0·068 g.; tubercle bacilli

child spent the month of July, 1940, in a holiday camp with case 1, and actually shared a bed with her during this time, which was just before case 1 was admitted to hospital.

CASE 2.—A boy 11 years old. This boy was sent to his local practitioner because the helper at the billeting office thought he looked thin. He had lost 6 lb. in one term. The doctor found signs in his chest and brought him to Cuckfield Emergency Hospital for investigation. The school medical officer had examined this boy clinically, with special care because of his family history, but on no occasion had he been radiographed. No note had been sent to the tuberculosis officer of the reception area. Physical signs: cavities at both apices. X rays confirmed physical signs. Patch test +++. BSR, 55 mm. in first hour. Stomach washout: many tubercle bacilli found.

This boy's mother had died of tuberculosis in February, 1940, before he was evacuated. One of his brothers had died some time before, also of tuberculosis; while the boy was in Cuckfield Emergency Hospital his sister was removed to a sanatorium where she also died. The child himself had attended a tuberculosis dispensary in London.

School contacts.—In all, 40 children and their teacher were examined, and 11 of them were found to have been infected with tuberculosis; 6 showed definite activity, 4 were healing, and 1 had an old calcified lesion; after three months 9 of these children were examined again and found to be healing; 3 of them were admitted to hospital for a period of observation after the first tests. It was noticeable that in this group the 4 most heavily infected children were girls.

Billet contacts.—Case 2 was billeted with 5 other normal children, 3 of whom were infected by him; contacts C and D shared a bedroom with him.

CONTACT C.—A boy 10 years old. No physical signs. X rays showed right hilar flare. BSR, 20 mm. Patch test +. Stomach washout, tubercle bacilli not seen, but inoculated guineapig died of tuberculosis six weeks later.

CONTACT D.—A boy 9 years old, brother of contact C. Right hilar pneumonitis. X rays showed right hilar gland enlargement. Patch test +++. BSR, 25 mm. Stomach washout, tubercle bacilli present.

CONTACT E.—A girl 5 years old. Diminished air-entry and moist sounds over right base. X rays showed tuberculous infiltration from right hilum all over right lower lobe. Patch test ++. BSR, 40 mm. Stomach washout negative. This child became very ill after admission to hospital, with a swinging temperature and signs of consolidation at right base. She made a gradual recovery and was transferred to a sanatorium.

Group II.—Cases illustrating the effect of billeting healthy children in households where there is or has been tuberculosis.

CONTACT F.—A girl 5 years old. Admitted to Cuckfield Emergency Hospital with phlyctenular conjunctivitis in both eyes. Diminished air-entry and moist sounds, right base. X rays showed 1° focus (Ghon) right lower lobe and enlarged hilar glands. Patch test ++++. BSR, 25 mm.

This child was evacuated with her 5 brothers and sisters, all previously healthy. They were billeted with a foster-mother who was known to have had tuberculosis eight years before; she had a bad cough again at the time the children were living with her, but refused examination. The family were investigated, and 4 out of the 6 children had tuberculosis. Contact F and her twin brother contact I were in the same class at school and this class was also examined. The results of this school investigation are reported under group III.

The fact that 4 of the family were infected, the 2 elder ones not in the same class as the others, makes it unlikely that they were infected at school.

CONTACT G.—A girl 10 years old. Diminished air-entry and moist sounds at right base. X rays showed enlarged right hilar glands. Patch test ++. BSR, 29 mm.

CONTACT H.—A boy 9 years old. No physical signs. X rays showed suspicious glands right root. Patch test ++ BSR, 16 mm.

CONTACT I.—A boy, 5 years old, twin of contact F. No physical signs. X rays showed tuberculous mediastinal glands. Patch test +++. BSR, 25 mm.

Group III.—Cases illustrating the results of neg the investigation of child contacts.

CASE 3.—A girl 6 years old. Admitted to Cuckfield Emergency Hospital in February, 1941, with miliary tuberculosis. Diagnosis was confirmed by autopsy. This child was infected by her aunt, a young adult who entered a sanatorium in October, 1940, after being ill some months. Case 3 had often visited her up to September, 1940, when the child was evacuated with her family. There is no evidence that case 3 was examined in London, and no note was sent to the tuberculosis officer of the reception area.

Billet contacts.

CONTACT J.—A boy, 5 years old, brother of case 3. No physical signs. X rays showed enlarged hilar glands. Patch test ++. BSR, 42 mm.

CONTACT K.—A boy, 4 years old, first cousin of case 3. No physical signs on admission. X rays showed enlarged hilar glands. Patch test +++. BSR, 35 mm. This child developed tuberculous meningitis in hospital and died after six weeks. Tubercle bacilli were found in the cerebrospinal fluid.

Case 3 had one other brother who was not infected and has remained healthy.

School contacts.—Case 3 attended an evacuated school; all the children, 39 in number, in the junior class were examined together with their 3 teachers. The latter were not affected and no case of adult tuberculosis was found; it was concluded that the high incidence of tuberculosis in this class was due to case 3 who had a cough for three weeks before her acute illness and admission to hospital. Of the 39 children examined, 8 had evidence of recent tuberculous infection (i.e., patch tests more than ++, X-ray evidence of enlarged hilar glands, and raised sedimentation-rates). One had phlyctenular conjunctivitis at the time of examination. These children have been kept under observation for a year, and are all showing healing with calcification. One child relapsed later and had to be admitted to hospital again, but is now healing.

CONTACT L.—A girl 8 years old. Very pale child, who had lost weight. X rays showed enlarged hilar glands. Patch test ++. BSR, 10 mm.

CONTACT M.—A girl 5 years old. Moist sounds at right base. X rays showed infiltration right base. Patch test ++++. BSR, 6 mm.

These two girls were examined in this school group, and on further inquiry it transpired that their mother had died of phthisis four months before, and that the 2 children had been living with her. It is of special importance that they had not been fully investigated or kept under observation as child contacts. When the mother died, contact M was examined clinically but no X-ray picture was taken; contact L left the immediate neighbourhood and was not examined at all.

DISCUSSION

In reviewing these cases as a whole one is impressed, first, by the great importance of the search for child contacts and the little attention paid to them by most doctors who work among children. So great is the risk of infection that I believe all children who are known to have been in contact with a case of adult pulmonary tuberculosis should be regarded as having tuberculosis, until it is proved otherwise. The children in group III illustrate this; if a careful investigation of contacts had been made case 3 would have been discovered and either treated or kept under observation according to the findings. The other two children in group III emphasise this and also the importance of a full investigation of each child; contact L escaped examination altogether and contact M was only examined clinically. The partial investigation of a child—that is, without X rays and tuberculin tests—is more dangerous than no examination at all, because there is grave risk that he will be passed as normal and no further interest will therefore be taken in him, at a time when X rays might reveal early tuberculosis.

If case 2 in group I had
examinations he would h
had infected 3 other childı

It is noteworthy that both case 1 and case 2 had been examined in London and that case 2 had a very bad family history; even if these children were not considered infectious at the time of evacuation, the tuberculosis officer in the reception area should have been told about them so that they could have been watched; no such information was received by him about them or about case 3. Failure to follow this simple precaution led to 20 children being infected with tuberculosis, 1 of whom died and 4 of whom are still undergoing sanatorium treatment.

To be billeted with a case of open phthisis is a much greater danger than merely to attend the same school with a case, and some of our cases arose as a result of being billeted on an infected foster-parent. This also could have been avoided if billeting officers had been notified at the beginning of the war which houses were unsuitable for evacuees owing to the danger of infection. This is now being done, as a result of this investigation—but too late to prevent some unnecessary damage.

RECOMMENDATIONS

There should be more careful search for child contacts of tuberculous patients, and the children examined should be kept under observation for at least three months after the source of infection has been removed if they are negative at the first examination. If they are positive, of course, they will need observation at regular intervals for a longer period, or institutional treatment according to the activity of the disease.

Clinical examination only in children is worthless; all child contacts should have complete investigations including X-ray examination and tuberculin skin tests.

There should be closer liaison between tuberculosis officers in evacuation and reception areas. Such officers in reception areas should be told not only about children who are known to have had tuberculosis in the past but also about children who are contact cases.

Lastly, billeting officers should be told which households are unsuitable for evacuees owing to past or present infection.

SUMMARY

Three groups of cases are reported, illustrating the results: (1) of billeting healthy children with others who have open tuberculosis; (2) of billeting healthy children in households where there is or has been tuberculosis; and (3) of neglecting investigation of child contacts.

In the first group, one child had infected 2 others in her billet (one of whom died) and 4 children at school. Another child infected 3 out of 5 children in his billet; all 3 are still undergoing sanatorium treatment. He infected 6 children at school.

In the second group, a family of 6 children were billeted with a householder who had had tuberculosis; 5 out of the 6 were infected and had to receive institutional treatment.

In the third group, a child contact developed miliary tuberculosis and infected her cousin and brother living with her and 8 out of 39 children in her class at school.

Recommendations are made for greater care in evacuation and billeting, and also for a more extensive search for child contacts, whose examinations should include X-ray examination and tuberculin tests.

I wish to thank Dr. Wilfrid Sheldon and Dr. Philip Evans for access to their cases, and for much valuable advice; and Dr. Frank Langford, tuberculosis officer of East Sussex, for his help and coöperation.

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"... Precision is attained, once wrote Ambrose Bierce, 'by choice of the word that accurately expresses what the writer has in mind, and by exclusion of that which either denotes or connotes something else. As Quintilian puts it, the writer should so write that his reader not only may, but must, understand.' To achieve that, the writer must make use of the English language in all its motley, big words and little, new and old."—From a review of *Webster's Dictionary of Synonyms*, by Paul H. Oehser, *Science*, April 30, 1943, p. 401.

BACTERICIDAL ACTION OF ŒSTROGENS

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THE experiments recorded here are part of a series of investigations undertaken in an attempt to discover whether substances which are known to have physiological effects on animal metabolism have any recognisable action either on bacterial growth and reproduction, or on the simple chemical reactions characteristic of the metabolism of bacteria.

Preliminary trials indicated that diethyl-stilbœstrol possesses some degree of bactericidal activity. As it appeared possible that this fact might be put to some chemotherapeutic use, the subject was investigated further. Subsequently other substances possessing œstrogenic properties were examined in order to see whether there was any correlation between the œstrogenic and the bactericidal activities. Of the œstrogens produced in the animal body, œstradiol and œstrone were investigated, and of synthetic œstrogens in addition to stilbœstrol, hexœstrol and diethoxytriphenylbromoethylene. Hexœstrol gave results similar to those given by stilbœstrol but the naturally occurring œstrogens and diethoxytriphenylbromoethylene were not found to inhibit any of the organisms tested.

Source of materials.—The substances were used sometimes in the form of tablets or ampoules as marketed for clinical use and sometimes as pure crystals. With stilbœstrol and hexœstrol the results obtained with the tablets and the crystals were similar and equally consistent. With œstrone the market products were unsatisfactory for this purpose and only the results obtained from pure crystals are included here. The œstradiol and diethoxytriphenylbromoethylene were pure crystals.

Technique.—In the standard technique the substance being investigated was incorporated in liquid media in a series of decreasing concentrations. The usual starting-point was a 1 in 10,000 dilution in the medium; with crystalline stilbœstrol and hexœstrol 1% solution was made in absolute alcohol and added to the culture medium 1 part in 100. The other crystalline substances were not soluble to this extent in absolute alcohol and a saturated alcoholic solution of these (about 0·5%) was used as the source; as these materials gave negative results, great accuracy in measuring the concentration was not so important.

Serial dilutions were then made. Using stilbœstrol (crystals or tablets) preliminary tests were made with 1 in 5 dilutions, giving final concentrations of 1 in 10,000, 50,000, 250,000, &c. For more accurate determination of the end-points the series was 1 in 10,000, 50,000, 100,000, and subsequently every 50,000 or 100,000 to at least 500,000. Various nutrient media were used—peptone water, glucose peptone water with Andrade's indicator, broth, and glucose broth. The effect of adding horse-serum to these media was also investigated.

After the media tubes containing the additional material were prepared, they were sown with a loopful of a culture of the organism being tested, and incubated at 37° C. Within 15 minutes of inoculation of the tubes a loopful of each was plated on to an agar plate to demonstrate that the tube had been effectively sown. Subsequently loopfuls were similarly plated on to agar every day for the duration of the experiment and the growth or absence of growth from these platings was the criterion deciding whether the organism was still alive or had been killed. When dealing with hæmolytic streptococci, blood-agar plates were used for testing survival. Occasionally the substances were dispersed through solid media—agar or blood-agar.

For controls cultures were made in the same media as were used in the experiment omitting the substance being investigated; when an alcoholic solution was used a volume of absolute alcohol equal to the maximal volume in the experimental series was used in the controls.

Organisms tested.—The organisms used were all recently isolated from material sent to the laboratory for cteriological investigation. The strains of *Coryne- rium diphtheriæ* were all virulent to guineapigs. the hæmolytic streptococci exhibited β-hæmolysis and strains 4, 5 and 6 belonged to Lancefield's serological group A.

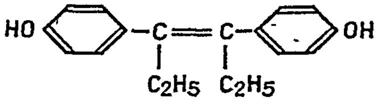
EXPERIMENTAL RESULTS

Diethylstilbœstrol and hexœstrol.—Diethylstilbœstrol has some bactericidal effect on all the organisms tested except the gram-negative bacilli. Approximately 150 experiments with stilbœstrol have been performed and all have given constant and completely consistent results. Hexœstrol has a similar action on those bacteria which were tested, but this substance was not so exhaustively studied. When using hexœstrol tablet, serial dilutions were not always made; in these cases results given in the table indicate that the figure is not necessarily the end-point. The accompanying table gives a summary of the effect of stilbœstrol and hexœstrol on various strains of bacteria in liquid media without serum.

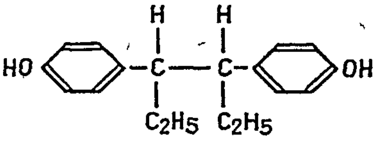
In addition to the organisms mentioned in the table, stilbœstrol tablets were tested against *Staph. albus* and *Strep. viridans.* These cultures were not plated to test survival, but judging by the appearance of the culture tubes (turbidity and change of colour of the indicator) both organisms had failed to grow in a concentration of 1 in 50,000 but had grown in 1 in 250,000.

Results from a preliminary experiment with tubercle bacilli indicate that stilbœstrol has an inhibitory effect on *Mycobacterium tuberculosis.* Two samples of sputa (480 and 481) containing many acid-fast bacilli were digested with 4% sodium hydroxide for 30 minutes at 37° C. and then centrifugalised; the deposits were neutralised with acid. To the deposit in each tube was then added 20 c.cm. of peptone water. The tubes were shaken to mix the contents, which were then divided into approximately equal halves. To one half of both 480 and 481 was added 0·2 c.cm. of a 1% solution of stilbœstrol in absolute alcohol (giving a concentration of 1 in 5000) and to the other halves 0·2 c.cm. absolute alcohol as controls. These four tubes were incubated 24 hours at 37° C. Sterility controls gave no growth from any of them. After the 24 hours 2 c.cm. from each experimental and control tube was injected subcutaneously into a guineapig. Then to the remainder of sputum 480 an additional 0·2 c.cm. of the 1% stilbœstrol was added to the experimental tube and 0·2 c.cm. of absolute alcohol to the control; 2 c.cm. of each was immediately injected into two other guineapigs.

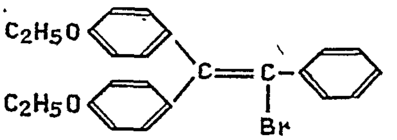
After 5 weeks the animals were killed. The three controls showed generalised tuberculosis; there was an abscess at the site of inoculation and the spleens were enlarged and contained tubercles; tubercle bacilli were found in smears from the abscess at the site of inoculation and from the spleen of all 3, and also from the lung in 1. In the 3 animals injected with material incubated with stilbœstrol the site of inoculation was not recognisable and there were no abnormalities in the viscera; no tubercle bacilli could be found in smears from the spleens.



DIETHYLSTILBŒSTROL



HEXŒSTROL



DIETHOXYTRIPHENYLBROMOETHYLE

From this single experiment it appears that incubation in vitro of tubercle bacilli with stilbœstrol (1 in 5000) prevents the production of generalised tuberculosis in the guineapig on subsequent inoculation. Th experiments are being continued.

The gram-negative bacilli appear to be resistant stilbœstrol. *Bacterium coli, Bact. oranienburg,* B. *aertrycke,* and *Bact. sonnei* grew in a concentration of 1 5000 stilbœstrol tablet as well as in the controls. This true also of *Bact. coli* at pH 7·6 and pH 5·4 in a dilutio of 1 in 10,000. *Proteus* is not affected by 1 in 10,000. Stilbœstrol crystals 1 in 10,000 did not inhibit any of following organisms in 48 hours: *Bact. coli* (two fæ

TABLE SHOWING THE MINIMAL CONCENTRATIONS OF DIETHYL-STILBŒSTROL AND HEXŒSTROL WHICH WERE BACTERICIDAL TO VARIOUS STRAINS OF BACTERIA

—	Diethyl-stilbœstrol crystals		Stilbœstrol tablet		Hexœstrol crystals		Hexœstrol tablet	
Duration of contact in hours	24	48	24	48	24	48	24	48
ORGANISM								
Staph. aureus								
1	1 : 100,000	1 : 100,000	1 : 100,000	1 : 100,000	..	..	1 : 100,000	1 : 10,000
2	1 : 50,000	1 : 50,000	1 : 50,000	1 : 150,000	..	..	1 : 50,000	1 : 100,000
3	1 : 50,000	1 : 50,000	1 : 100,000	1 : 150,000	..	..	..	>1 : 10,000
4	1 : 50,000	1 : 50,000	1 : 150,000	1 : 150,000	1 : 10,000	1 : 50,000	>1 : 50,000	..
Strep. pyogenes								
1	..	..	1 : 50,000	..	..	..	..	..
3	..	..	1 : 300,000	..	..	..	..	..
4	1 : 100,000	1 : 300,000	1 : 250,000	1 : 500,000	..	..	>1 : 100,000	..
5	1 : 100,000	1 : 250,000	1 : 100,000	1 : 100,000	..	..	..	..
6	1 : 100,000	1 : 300,000	..	..	< 1 · 200,000	..	..	..
C. diphtheriæ								
8384	..	..	1 : 250,000	..	..	..	..	..
9106	..	..	1 : 250,000	..	..	..	..	..
9193	1 : 100,000	1 : 100,000	1 : 100,000	1 : 100,000	..	..	1 : 250,000	..
9371	1 : 250,000	1 : 250,000	1 : 250,000	..	..	..	>1 : 50,000	..
9872	1 : 50/250,000	1 : 50/250,000	1 : 50/250,000	..	..	..	>1 : 10,000	..
10,590	1 : 150,000	1 : 200,000	1 : 100,000	1 : 100,000	1 : 200,000	1 : 500,000	..	..
298	1 : 100,000	1 : 100,000	..	..	..	..	..	..
Diphtheroid bacillus ..	1 : 50,000	1 : 50,000	..	..	..	..	..	..
Pneumococcus	..	..	1 : 250,000	..	..	..	..	..
Enterococcus	1 : 10,000	1 : 50,000	1 : 50/250,000	1 : 50/250,000	1 : 10,000	1 : 50,000	..	>1 : 10,000
Neisseria catarrhalis								
1	..	..	1 : 10,000	1 : 50,000	..	..	..	..
2	1 : 500,000	..						
Neisseria pharyngis ..	1 : 5,000	..						
Myco. tuberculosis ..	> 1 : 5,000	..						

The figure 1 : 50/250,000 indicates that no dilutions were made within the range 50,000 to 250,000 and that the end-point lies somewhere between these two.

strains and one urinary); *Bact. aertrycke*, *Bact. sonnei*, *Bact. paratyphosum B*, *Bact. oranienburg*, and Friedländer's bacillus.

Stilbœstrol tablet was also tested on 3 sporing bacilli, one obtained from milk, one from hay and one an accidental air-borne contaminant (*Bacillus mycoides*). Wi[illegible] isms, when an actively [illegible] used to inoculate the [illegible] by concentrations of 1 in [illegible]00,000 in the case of the hay bacillus and 1 in 250,000 with the milk strain. When however the experimental tubes were sown from an old plate in which every organism appeared to contain a spore, these survived in the stilbœstrol and, though they showed little or no growth in the tubes, gave good growths on the agar plates made from the [illegible] appears to be more resi[illegible]; [illegible]

[illegible] occasion with a purulent sputum containing a mixed flora. Peptone water culture media were prepared incorporating stilbœstrol tablet 1 in 10,000, 50,000, 250,000, &c., 4 c.cm. in each tube. Approximately 0·1 c.cm. of the sputum was added to each and a loopful of the mixture was plated after 24 hours and 48 hours. In these plates, the cultures from the tubes containing stilbœstrol 1 in 10,000 and 50,000 grew yeasts and gram-negative bacilli but no staphylococci, whereas the tubes containing stilbœstrol 1 in 250,000 or less grew pure cultures of *Staph. aureus* after 48 hours and almost pure cultures after 24 hours; when the staphylococci survived they had completely overgrown the few other organisms present.

The action of stilbœstrol is not rapid even in the greatest strengths used. Cultures made in the usual manner were subcultured on to agar plates every half hour to determine the period of survival. A strength of 1 in 10,000 of the crystals kills *C. diphtheriæ* in 1 hour and *Staph. aureus* in 2 hours; 1 in 50,000 kills *C. diphtheriæ* in 2 hours and *Staph. aureus* in between 18 and 24 hours. As seen from the table above there is in some cases increase in the bactericidal activity after 24 hours; there is very seldom any further increase after 48 hours.

If the experimental tubes are sown with a massive inoculum (e.g. equal volumes of the medium and of a broth culture of the organism) instead of with a loop of culture, a longer time is required to kill it; in these circumstances some organisms may still be alive after 48 hours in a strength of 1 in 10,000. In dilutions which are too great to kill the organism there is often inhibition of growth; tubes which contain no visible growth may be shown by subculture on to agar plates to contain viable organisms. From this it may be concluded that concentrations which are insufficient to kill are bacteriostatic.

On two occasions the cultures of *C. diphtheriæ* which had survived in stilbœstrol for three days (strain 9193 in a 1 in 250,000 strength and 298 in 200,000) were transferred to Loeffler slopes and after 24 hours growth were inoculated into guineapigs; the control tubes were treated similarly. All 4 animals died in between 20 and 26 hours—the two experimental animals sooner than the two controls. Hence it appears that contact with stilbœstrol in a strength which was bacteriostatic did not reduce the virulence of the organism for guineapigs.

When stilbœstrol has been incorporated in the sub[illegible] r to those obtained [illegible]; the end-points by this method have not been investigated.

The addition of 5% or more of horse-serum to the medium reduces the bactericidal action on *Staph. aureus* and *C. diphtheriæ* of a 1 in 10,000 concentration of stilbœstrol. In the presence of 25% filtered sheep-serum a concentration of 1 in 2500 stilbœstrol kills *Staph. aureus* 4, but 1 in 5000 does not.

The effect of variations in pH have not been exhaustively studied, but such data as have been collected indicate that changes in pH between 5·2 and 8·0 do not affect the results. The routine media have a pH of approximately 7·6 and the addition of the stilbœstrol does not change this reaction.

The effect of temperature was indicated in one experiment in which *Staph. aureus* was killed in 24 hours: at 37° C. by 1 in 100,000; at 22° C. by 1 in 50,000; and at 5–7° C. by 1 in 5000 (but not 1 in 10,000).

ŒSTRADIOL

Œstradiol crystals, under the conditions of these experiments and at a pH of 7·6, appear to have no inhibitory action in a strength of 1 in 10,000 in liquid media on: *Staph. aureus* 1, *Staph. aureus* 4 (with and without serum), enterococcus, and 4 strains of *C. diphtheriæ*—2 of [illegible] it serum and in a concentra[illegible]porated in an agar plate in a strength of approximately 1 in 7500 the following organisms failed to show any inhibition compared with a control plate : *Staph. aureus* 4, four strains of *C. diphtheriæ*, *N. catarrhalis*, *Bact. coli*, hæmolytic streptococcus and enterococcus.

ŒSTRONE (KETOHYDROXYŒSTRIN)

Œstrone crystals were added to broth at pH 6·0 and 7·8 in dilutions between 1 in 10,000 and 1 in 200,000, and were incorporated in an agar plate and in a blood agar plate (1 in 10,000). The liquid media were inoculated with three strains of *C. diphtheriæ* (9193, 9871 and 10,599) but there was no difference between the experimental tubes and the controls at either pH. On the plates there was no recognisable difference between either plate and the corresponding control when sown with *Staph. aureus* 1, 2, 3 and 4 ; *C. diphtheriæ* 9193, 9871 and 10,599 ; *Bact. coli* 1 and 2 ; hæmolytic streptococcus 4 and 5 ; and *Bact. sonnei*.

DIETHOXYTRIPHENYLBROMOETHYLENE

Diethoxytriphenylbromoethylene was tested in a concentration of approximately 1 in 7500 in glucose peptone water and in an agar plate. In the liquid medium there was no inhibition of *Staph. aureus* 4, *C. diphtheriæ* 9871 or enterococcus after 72 hours, or of *Bact. coli* after 48 hours. On the agar plate there was no inhibition on the experimental plate compared with the control in the growth of *Staph. aureus* 3 and 4 ; *C. diphtheriæ* 9193, 9871 and 10,599 ; enterococcus, *Bact. coli*, hæmolytic streptococcus 4 and 5, or *Neisseria catarrhalis*.

DISCUSSION

From the data given above it appears that stilbœstrol has a bactericidal effect on gram-positive cocci, *C. diphtheriæ* and *N. catarrhalis*. The minimal effective concentration varies somewhat between the various organisms but in all cases lies between 1 in 5000 and 1 in 500,000. The staphylococcus and enterococcus appear to be slightly less sensitive than either hæmolytic streptococcus or *C. diphtheriæ*. The minimal time in which a bactericidal action has been recorded is one hour (*C. diphtheriæ*) ; the staphylococci are less sensitive in this respect also. In concentrations insufficient to kill the organisms the substance has a bacteriostatic action.

Comparison between the results obtained with the synthetic œstrogens and the naturally occurring hormones indicates that there is no correlation between the possession of œstrogenic and bactericidal properties. The most obvious feature which links stilbœstrol with hexœstrol and separates them both from œstrone, œstradiol and diethoxytriphenylbromoethylene is the chemical structure. As seen from the formulæ given above stilbœstrol and hexœstrol are closely related chemically ; moreover they both possess within the molecule two free phenol rings, which are not present in the other substances. Whether this is the essential feature explaining the results recorded here cannot at present be estimated. It is hoped however that investigations (now on hand) of a series of compounds closely related chemically to stilbœstrol will help to determine whether the bactericidal action can be associated with any particular group of atoms within the molecule.

The action of stilbœstrol resembles in two respects that of the dyes of the triphenylmethane series (e.g. crystal-violet and gentian-violet). According to standard works of reference, gram-positive organisms are as a rule susceptible to the bactericidal action of these dyes but gram-negative organisms (with the exception of *Vibrio choleræ* and gram-negative cocci) are resistant. Moreover the presence of serum greatly reduces the bactericidal action of these dyes.

No published work bearing directly upon this subject has been found. A few papers have been published dealing with the effect of various hormones upon infection in animals, but as these do not deal with the synthetic œstrogens and as the present communication does not deal with animal infections they are not discussed here.

In the last few years the natural œstrogens have gained some reputation in the local treatment of recurrent boils on the face. In view of the negative results up to date with these substances it is not possible to correlate the clinical improvement observed in these patients with any ct bactericidal action.

SUMMARY

Diethylstilbœstrol is bactericidal, and in lesser concentrations bacteriostatic, to gram-positive cocci, *C. diphtheriæ* and *N. catarrhalis*. No inhibitory action on the gram-negative bacilli has been found. The minimal lethal concentration varies somewhat between these organisms, but in all those recorded lies between 1 in 5000 and 1 in 500,000.

Tubercle bacilli were killed by incubation in vitro with stilbœstrol 1 in 5000.

Hexœstrol also possesses bactericidal properties.

Other œstrogenic substances (œstrone, œstradiol and diethoxytriphenylbromoethylene) have not been found to have any bactericidal action.

The bactericidal activity of stilbœstrol is reduced in the presence of serum.

I wish to thank Dr. A. I. Messer for help and advice throughout the course of this investigation ; also Lieut.-Colonel J. H. Gaddum for much assistance on the pharmacological aspects of the problem ; Dr. J. M. Robson for the supply of stilbœstrol crystals, œstradiol and diethoxytriphenylbromoethylene, and Messrs. Boots for the pure crystalline hexœstrol.

GUNSHOT ANEURYSM OF CAROTID ARTERY

Richard S. Handley
M B CAMB, F R C S

Michael Oldfield
M CH OXFD, F R C S

MAJORS RAMC

TRAUMATIC aneurysms are more common in war than in times of peace. Their treatment, when they occur in arteries whose collateral circulation is uncertain, offers problems of great surgical interest ; and we have therefore recorded, with some hesitation, a single case of traumatic aneurysm of the carotid artery.

CASE-HISTORY

A private, aged 21, was wounded on Dec. 5, 1941. He was taking part in an infantry attack ; the objective was 500 yards away, and he was hit by a machine-gun bullet when he had covered half the distance. He was knocked over and lost consciousness for a few minutes. On coming round he felt " a boring effect in the jaw but very little pain." He was bleeding profusely from the mouth. He could not speak or call to the stretcher-bearers as his " voice seemed to have gone " but he was able " to make noises." He lay out on the field for about 15 minutes and was then dragged back on his stomach across the sand by a stretcher-bearer. A shell dressing was applied at the regimental aid-post. After a journey lasting 8 days, during which dressings and mouth-washes were given at the various medical units through which he passed, he reached a maxillo-facial unit.

On examination he was pale and exhausted with a pulse-rate of 112 and temperature of 101° F. There was a small entrance wound in the right side of the upper lip, 1 in. long, just above the angle of the mouth. The right side of the mandible was comminuted near the angle and loose fragments of bone and tooth stumps, all heavily infected, were visible inside the mouth. There was an exit wound, 1½ in. long, on the back of the neck, 1 in. to the right side of the sixth cervical spinous process. His condition improved with rest and administration of fluids, and with Major W. R. Roberts collaborating in dental treatment, the external maxillary artery and vein were tied, sepsis subsided and the mandible was soundly healed by the beginning of May, 1942.

Meanwhile a swelling had appeared behind and below the angle of the mandible on the right side and had slowly increased in size. During this period of enlargement the patient suffered from three very severe attacks of right-sided headache which reached a climax in the early morning and were immediately relieved by vomiting. He had never fainted since the initial loss of consciousness following his wound. As the swelling increased in size, it was noticed to have expansile pulsation though no thrill nor bruit was detected. March 12 the swelling measured 1½ in. by ¾ in. It w spindle-shaped, tense but not hard, and its posterior margin disappeared behind the anterior border of the right sterno-mastoid. Inflamed lymph-glands somewhat masked its outline. The patient was by now in good condition (hæmoglobin 102%) but he spoke only in a hoarse-whisper and Major I McNaughton reported that the right vocal cord was fixed in abduction while the left came across the midline. Major H Aitcheson reported that the optic discs were normal. The general physical examination revealed no other abnormality nor did examination of the urine, Wassermann reaction, nor X ray of the chest

Operation —May 12, 1942 Endotracheal anæsthesia by Capt. A W Raffan A 6 in crease line incision was made from a point 1 in below and behind the tip of the mastoid process curving obliquely downwards and forwards to the centre of the lower border of the thyroid cartilage The anterior border of the sternomastoid was defined and the superficial surface of the sac exposed It appeared bluish and comparatively thin walled, and arose from the bifurcation *of the carotid, the jugular vein was stretched over the sac* as a white band (fig 1) The common carotid was then exposed at the level of the omohyoid where it was found to be healthy, it and the jugular vein were divided between silk ligatures

The aneurysm was now separated from the deep aspect of the sternomastoid, the eleventh nerve being identified and preserved Dense adhesions bound the sac to the deep structures of the neck and in freeing its deep surface it was necessary to divide the vagus (which was already known to be damaged) as well as the superior thyroid vessels At this stage the cervical sympathetic chain must also have been divided, though it was never identified

The lower part of the sac was now free Its upper part vanished behind the digastric muscle and the parotid gland towards the base of the skull The sac was grasped and drawn downwards while the digastric and parotid were retracted upwards Dissection revealed the upper part of the jugular vein, which was freed from the eleventh nerve, and divided between silk ligatures near the base of the skull The site where the tapering upper end of the aneurysm merged with the healthy distal portion of the internal carotid now became

carotid was now the sole attachment of the sac, it was divided between ligatures and the sac was free (fig 2) Hæmostasis was completed In view of the presence of enlarged lymph glands the wound was dusted with sulphanilamide powder before being closed with interrupted sutures and a small drainage tube was left in its lower corner The patient reached the ward with a pulse rate of 90 and the intravenous saline which had been started in the middle of the operation was stopped 3 hours later

The patient's general condition never gave the least anxiety, a pulse rate of 100 being the highest recorded He was found to have a Horner's syndrome on the right side The optic discs remained normal and the voice was hoarse as before There was paresis of the right half of the tongue

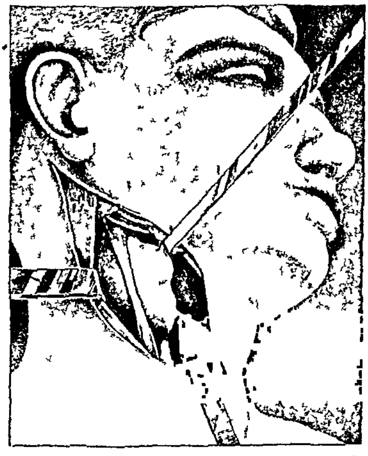
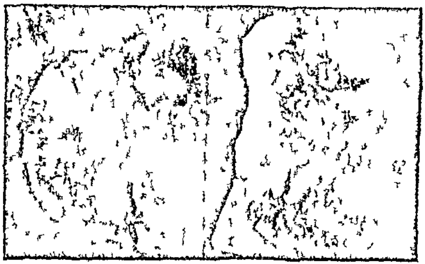


Fig. 1—The aneurysm at operation (semi-diagrammatic) Vessels entering the sac are the common carotid superior thyroid and external carotid arteries



(a) (b)

Fig 2—The aneurysm (having shrunk considerably) after removal and fixation (a) anterior surface with the jugular vein crossing it and the common carotid entering its lower pole (b) Posterior surface of the sac with the common carotid entering its lower pole The hole at the upper aspect was caused by leaving the tapering upper end of the aneurysm attached to the stump of the internal carotid

(the hypoglossal nerve had not been identified at operation) The wound healed in a week and he was allowed out of bed *in 14 days*

A month after his operation he was evacuated to England as a walking patient His scar was linear The movements of his tongue had so far improved that on protrusion there was only slight deviation to the right The Horner's syndrome was unchanged

DISCUSSION

The surgery of carotid aneurysm would be interesting only for its operative technique, were it not for the fact that hemiplegia sometimes follows interruption of the carotid blood stream The frequency of cerebral complications is given by *DaCosta* (1920) as 20–25% of cases operated on, and Jordan (1907) says that brain disturbances appear in 25% and fatal softening of the brain in 10% Crile is quoted as stating that half those who develop cerebral symptoms die Horsley (1915) says that hemiplegia is much more frequent in patients over the age of 10

In considering the risks of hemiplegia in relation to ligature of the carotid vessels it is necessary also to bear

carotid bleeds almost as fast as the proximal end, owing to its rich anastomosis with the opposite side Thus it is more dangerous to tie the internal carotid or both the common and the external carotids than it is to tie the common carotid alone Ligature of the carotid is more dangerous when the injury is recent, especially if it is done in the proximity of the battlefield (Makins 1915), than when a chronic condition like an aneurysm has already slowed the carotid blood stream Thus Sencert (1918) in his classical monograph on wounds of the vessels, writing of carotid aneurysms, says "It is
f the common carotid " is not
his is not remarkable in view of
for the establishment of the
He
d at
aneurysm of the common ca
ligature of both ends of the ve
was due to bronchopneumonia Lawford Knaggs (1920) operated on 2 cases of carotid aneurysm in the last war, and cured them by ligature of the common carotid Winslow (1920) collected 13 cases of aneurysm of the extracranial part of the internal carotid, operated on by American surgeons, of whom which only 1 died from hemiplegia while 1 died from sepsis and secondary hæmorrhage

It seems then that unilateral interruption of
carotid circulation is not as dangerous as is
supposed in people under the age of 40 wi
arteries, especially when time has
original injury was received, though ther
in arguing from a collection of recorded
surgeons tend to publish their successes
failures without benefit of trumpets

Certain measures have been advocated to reduce the risk of hemiplegia, chief among which is provisional ligature of the common carotid in such a way that the ligature can be slackened or removed if the patient shows cerebral symptoms. But provisional ligature would only provide against the first of three possibilities. Hemiplegia, if of immediate onset, must be due (i) to inadequate collateral circulation; but if of delayed onset it may be due either (ii) to thrombosis spreading up from the site of the operation to block the circle of Willis or (iii) to embolus from the operation site. A search of the literature, seriously hampered by war conditions, has not yielded much evidence on the subject of what dangers may be expected from the second and third mechanisms, but it is usually assumed that the first is the common cause of hemiplegia, perhaps from analogy with the behaviour of limbs whose main vessels are tied for acute injury. Such limbs, if they become gangrenous, usually cool immediately and show the colour changes which progress to the leaden hue of certain death. But limbs do not always become gangrenous in this way and many surgeons will recall cases like the following one.

A patient under the care of one of us (M. O.) recently suffered a bullet wound of the femoral artery which required tying. The limb immediately became pale and cold, but the following morning was warm and pink, even to the toes; 6 days later the toes became cold and discoloured, and they were afterwards amputated for gangrene.

This vascular accident must surely be attributed not to any primary inadequacy of the collateral circulation but to spreading thrombosis or embolus from the operation site which reduced the blood-supply on the sixth day. Parallel cases are to be found in published work on carotid ligation where hemiplegia has been known to develop up to 14 days after the carotid has been tied; this again must surely be due to thrombosis or embolus in a collateral circulation which sufficed in the immediate postoperative period.

Provisional ligature, before a more extensive operation for aneurysm, can only prove useful if the hemiplegia is usually due to primary insufficiency of the collateral circulation. It might actually increase the dangers if spreading thrombosis or embolus is generally responsible for the hemiplegia. The pathological and clinical evidence is by no means conclusive on this important point. One thus finds Makins (1915) considering that embolus is an important factor and Winslow (1920) believing that spreading thrombosis is relatively common. On the other hand Halsted and Crile (quoted by Matas) and Jordan (1907) clearly consider that primary insufficiency is the crux of the matter, because they advocate provisional ligature or occlusion by such agents as aluminium bands, rubber-covered clamps, or slowly tightened bands of tape or catgut. Matas (1909) even says that provisional ligature is an essential before any operation on a carotid aneurysm.

The infrequency of hemiplegia after operation, the divergence of opinion among those best qualified to speak, and the apparent lack of sound pathological evidence on the ætiology of hemiplegia lead us to suggest that provisional ligature should not be done for a carotid aneurysm in a patient under 40 years old.

Makins (1919) showed in the last war that the risk of gangrene in limbs was diminished by ligating the companion vein at the same time as the artery. The validity of his conclusions has never been disproved, though some now doubt it, and we think it wise always to tie the jugular vein at the same time as the carotid since we regard the analogy between gangrene of limbs and hemiplegia as sound.

Radical excision is the most certain method of cure for any aneurysm in an accessible position. This applies particularly to the neck where there are concentrated within a small compass vital life-lines which are very susceptible to pressure. Quite a small tumour, whatever its nature, may exert damaging pressure, and Sencert has said that even the fibrosed remnants of a thrombosed aneurysm may irritate nerves. Excision is no more dangerous as a cause of hemiplegia than alternative procedures and has the advantage of providing a guarantee against recurrence.

Some surgeons have followed excision by constructive ions in order to maintain the carotid blood-stream. After excision of a saccular aneurysm, for example, it might only be necessary to suture a small lateral wound in the main artery. If a complete segment of the artery must be sacrificed, it is unlikely that a simple end-to-end union could be done without undue tension. Even before the introduction of heparin, patients recovered during the last war in whom vein transplants were used to bridge the gap created by excision of an aneurysm. In the neck it is probable that only a small percentage of aneurysms would be so situated that these delicate feats could be done; and it is essential that an entirely satisfactory suture line be secured at each end of the transplant in a situation where fatal hæmorrhage cannot be staved off by the application of a tourniquet. It is probably best to remain content with excision alone, unless the situation shows itself peculiarly favourable. This is not nearly so likely with the type of aneurysm under discussion as it is with arteriovenous aneurysm.

One or two cases have recovered on a regime of complete rest (Lawford Knaggs 1920, Walther quoted by Sencert). In view of the overwhelming danger of ultimate rupture, the method does not deserve serious consideration. Various types of ligature are required for aneurysms which are inaccessible. Proximal, distal, double, and multiple ligature have all been practised with success since the days of Astley Cooper. But ligature is not nearly so certain as extirpation and not much less dangerous. Obliterative aneurysmorraphy appears to show no advantage over ligature but has many disadvantages. Reconstructive aneurysmorraphy has theoretical merits. We have found only one record of a case where it was used on the carotid (McMullen and Stanton 1910), and the patient died from secondary hæmorrhage.

Finally, the choice of the time for operation on a traumatic aneurysm requires nice judgment. If the operation is too early, an adequate collateral circulation will not be established. If it is too late, dense adhesions and damaged nerves will be encountered if the patient has not already died in the dramatic and terrible circumstances which accompany the rupture of an aneurysmal sac.

SUMMARY

A case of traumatic aneurysm of the bifurcation of the common carotid, due to gunshot wound, is recorded. Its treatment by excision of the sac and the recovery of the patient is described.

The dangers of hemiplegia after interruption of the carotid blood-stream are discussed and are thought not to be great when the presence of an aneurysm has already slowed the blood-stream and the patient is under 40 years of age.

The mechanism of hemiplegia is considered and it is suggested that embolus or spreading thrombosis rather than primary insufficiency of the collateral circulation is responsible where the onset of the hemiplegia is delayed.

It is advised that provisional ligature be omitted before operations for traumatic aneurysm of the carotid in young adults.

Radical excision of the sac is recommended as the treatment of choice, and alternative methods are briefly considered.

Postscript.—This article was written in the Middle East where it was difficult to gain access to the writings of others. A paper by J. Schorstein (*Brit J. Surg.* 1940, 28, 50) has recently come to our notice wherein are discussed many of the points we have raised.

We thank Major-General D. C. Monro, consulting surgeon, Middle East Forces for his help in discussion; Colonel Q. Wallace for permission to publish the case; and Privates Alexander and Stammers, RAMC, for the drawing.

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PELLAGRA IN PSYCHIATRIC PRACTICE

TWELVE RECENT CASES

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PELLAGRA is usually considered a rare disease in this country,[1] but in the United States information "has been collected recently which dispels any uncertainty concerning the wide dis[illegible] in representative cit[illegible] south) of the country, [illegible] estimated that there were 100,000 pellagrins in the U.S.A. in 1938. Pellagra may therefore be commoner in Britain than is generally supposed, despite the high nutritional level of the general community.

The diagnosis of a frank case of the disease should not be difficult, but milder cases are not easy to recognise, especially in view of the absence of reliable confirmatory chemical tests.[4]

Pellagra and nicotinic acid deficiency-states come under the purview of the consultant psychiatrist and the psychotherapist as well as the general physician. Symptoms in the mental sphere are almost constantly present and occur early.[5, 6] Severe cases may present an actual psychosis, while the symptoms of mild cases may simulate a psychoneurosis. It has been amply demonstrated that the mental symptoms as well as the other marks of the disease respond (in recent cases, at any rate) rapidly and usually dramatically to specific therapy.[5]

PELLAGRA DEVELOPING IN CHRONIC PSYCHOSIS

The table summarises the main clinical findings in 10 recent cases of pellagra encountered among chronic psychotic patients. The symptoms are arranged from left to right approximately in the order of relative frequency given by Spies.[5, 7] Mental symptoms are not included because the patients were already psychotic. Stomatitis (apart from glossitis) was not observed; this may have been partly due to the difficulty in assessing this sign in refractory patients. Porphyrinuria [illegible] this is the subject of an inde- [illegible] stances the appearance of a [illegible]—in most cases after exposure to sunlight—betokened the true clinical condition. It *occurred over those areas of skin commonly affected in* pellagra, mostly the face, neck and back of the hands, but also in some cases on the back of the forearms, dorsum of the feet, front of the legs, elbows and buttocks; it was symmetrical and usually sharply demarcated, while the affected skin became roughened and deeply pigmented. The glossitis was mild and usually marginal. The loss of weight, which averaged 23¼ lb. in the 10 cases, was usually gradual, but was sudden in some instances. Loss of strength out of proportion to the drop in weight was observed.

Diarrhœa was a prominent but misleading symptom, since Flexner dysentery is endemic at the hospital. Four patients (cases 1, 5, 6 and 8), considered to be chronic dysenterics (carriers) in spite of a lack of bacteriological confirmation, subsequently proved to be pellagrins. The date of onset of diarrhœa (see table) possibly indicates when the pellagrous disease process began in these cases.

Examination of the central nervous system was diffi- [illegible] d in 5 patients consistent with [illegible] ent in the lower limbs. Thus [illegible] endon reflexes in cases 7 and 8, impairment in cases 5 and 6 and well-defined sensory disturbances in case 9. In 2 cases the pupils were noted to be inactive to light before treatment. Tremulousness, particularly in the tongue, was found in 3 instances (cases 3, 5 and 7) and peculiar jactitations involving the body and limbs were seen in 2 of these (cases 3 and 5). Varying degrees of ataxia—as shown by an unsteady gait—was noted in 7 cases. In cases 3 and 6 an ulcerative process of the vulva and adjacent perineum, probably [illegible] be summarised as an increased withdrawal from reality.

Ætiological considerations.—Almost all the patients were in such a state of mental deterioration as to need constant nursing supervision, including help at mealtimes owing to faulty feeding habits. Thus, some patients bolted their food constantly in animal-like fashion; a few were suspected of capricious habits at mealtimes, such as surreptitiously disposing of their food. Freeman,[9] who reports 2 cases in psychotic patients, says: "It would seem advisable to regard all mental hospital patients who show faulty eating habits, or refuse food, as potential pellagrins."

A possible factor is Flexner dysentery. In 2 patients (cases 1 and 6) manifest pellagra followed shortly after an acute attack of dysentery, suggesting that this had precipitated the deficiency disease. Cases with a history of long-standing diarrhœa may have been infected with dysentery at an earlier period in spite of negative bacteriological findings—a chronic subpellagrous state [illegible] an attack of acute dysentery, [illegible] state developed as a result of [illegible] hronic dysentery. McLester[10] [illegible] diarrhœa may so interfere *with absorption as to lead to nutritive failure.* Sydenstricker[8] has commented on the atrophic mucosa found [illegible] tal cases of [illegible] al deficiency [illegible] he failure of [illegible] Possibly, in some cases, the first step in this vicious circle was interference with the absorption of available vitamins by changes in the gut due to dysentery.

MAIN SYMPTOMS IN A GROUP OF 10 WOMEN PATIENTS WITH PELLAGRA

Case	Diagnosis	Age	Pellagra recognised (1942)	Weight lost	Glossitis	Dermatitis	Date of onset in 1942	Diarrhœa	Date of onset	Tachycardia	Peripheral neuritis	Pupils inactive to light	Ataxia	Tremulousness	Vomiting	Vaginitis	Blood-count			
																	Red cells	Hb.	C I.	White cells
		yr		lb													millions	%		
1	Chr sch.	38	4 v	34	+	++	4 v	++	30 XII 40	..	..	..	+	..	..	..	..	..	..	..
2	Dementia	60	18 v	11	+	+++	29 IV	O	..	..	..	..	..	..	..	..	..	..	..	..
3	Chr sch.	42	5 II	28	++	++	5 II	+	..	+	..	..	..	+	..	+	3·820	10·0	0·86	4,025
4	Chr. sch	40	6 v	28	+	++	15 IV	++	8 II 42	..	..	..	+	..	..	..	..	..	..	..
5	Chr. sch	40	20 v	52	++	++	6.v	++	31 X 40	..	+	+	+	+	+	..	..	..	..	..
6	Imbecility	36	20 v	21	+	++	6 v	++	9 I 41	..	+	..	..	..	..	+	..	..	..	..
7	Chr sch	41	4 v	14	++	++	4 v	O	..	..	++	+	+	+	..	..	..	..	..	..
8	Chr. sch	35	29 VI	14	+	++	26 VI	++	10 V 40	..	++	..	+	..	+	..	4·390	11·8	0·88	14,000
9	Paraph	60	19 VII	14	+	++	16 VI	O	..	..	+	..	+	..	..	..	5·070	14·3	0·9	6,700
10	Chr sch	55	19 VII	16	O	+	19 VII	+	9 VI 42	..	..	..	+	..	..	..	3·660	11·2	1·0	9,400

+ = present, ++ = considerable, +++ = severe, O = absent
Chr. sch. = chronic schizophrenia; Paraph. = paraphrenia

Probably of greater importance was improper dietary. Half the patients were unable to eat the ordinary standard diet of the hospital; minced meat and pounded fish provided the main protein substitutes. Some patients were given "fish diets" for a considerable period in a mistaken therapeutic effort to control diarrhœa, and the reduction of the previous plentiful supply of milk and eggs, particularly during the winter months, was undoubtedly a contributory factor, as these foods are normally ordered for patients unable or refusing to eat meat (such as pork, beef and liver).

Probably a combination of factors operated in the production of the disease.

Treatment.—All patients were treated with large doses of nicotinic acid, either by mouth or parenterally. The initial doses used were 500 mg. a day in ten divided doses by mouth, or 40 mg. thrice daily intramuscularly. Subsequently the dosage was reduced to a maintenance dosage of 100–150 mg. a day by mouth. The response to treatment was a dramatic improvement in all cases. The mild glossitis disappeared rapidly within a day or two; an obvious improvement in the dermatitis was evident at the end of a week to ten days, and at the end of a month there was little trace of a rash in any patient. With the exceptions below the patients' appetites were remarkably improved. Diarrhœa was as a rule promptly controlled. A gradual return of strength enabled patients confined to sick bed for months to be up and about.

The treatment in 3 gravely ill patients (cases 3, 5 and 7) probably tided them over the danger period; moreover the tremulousness and pupillary abnormalities disappeared. Cases 5 and 7 still remain stuporous and difficult with food. The signs of neuritis in case 5 became more pronounced after nicotinic acid. This phenomenon has been noted by others, and the improvement in the neuritis which occurred in the other cases must be attributed to the improved intake and absorption of vitamin B_1 in the foodstuffs ingested, and not to the nicotinic acid. Case 1 developed an angular stomatitis as the pellagrous rash was fading. The mechanism of the production of this lesion, presumably due to ariboflavinosis, may be similar to that propounded for the "development" of peripheral neuritis with nicotinic acid. Thus, Sydenstricker[8] states: "It is particularly important to refrain from treating presenting symptoms due to a single predominating avitaminosis with large amounts of the specific vitamin. This procedure is almost certain to precipitate the manifestations of coincident subclinical deficiencies of other members of the group."

Three cases (1, 6 and 10) were treated in the spring and summer months of 1941 with nicotinic acid because pellagra was suspected, but the drug was discontinued during the following winter and spring months. This suggests the need for long specific treatment in chronic cases.

PSYCHOSIS DEVELOPING IN PELLAGRA

The following cases, both admitted to an observation ward for mental disorders, illustrate the need for the recognition and treatment of nutritional disorders in the general population.

CASE 11.—A married woman, aged 37, was admitted on Aug. 5, 1942, with depression. No past or family history of mental disorder. She was said to have had a finicky appetite for 18 years, rarely touching home-cooked fish or meat. Working at a munitions factory in early 1942, her workmates remarked on her unhealthy appearance. Her legs were said to "puff up to twice their size" in the evenings, and ulcers developed over the ankles. In the last four months she had neglected herself, had become irritable and afraid. There was a pronounced feeling of weakness particularly in the arms and feet. She had "attacks" in the street, when she suddenly complained of the legs having given way; she would become "fixed" in a sideways, bending posture; when she walked again she seemed first to drag the legs after her, then lift them high and carefully as if they were heavy. At the same time she would say that she was "talking funny." In the last few weeks she had complained of numbness and pins and needles in the arms and legs. Her eyes felt "funny" and at times she could see double. She became increasingly lethargic. She was admitted to hospital after having had a "rigid attack," and was later transferred to observation ward as she became depressed, restless and noisy.

She was then depressed, agitated and restless, with ideas of guilt and unworthiness. Ideas of reference were prominent —she thought everyone knew about her private affairs. She was very difficult with her diet, needing spoon-feeding. She was very thin and so weak that she was unable to stand. There was a typical mild pellagrous rash over the face, back of the hands, dorsum of the feet, elbows and buttocks. The tongue was rather smooth, and a to-and-fro tremor resembling that seen in GPI was noted. CNS otherwise appeared normal. She passed 2–3 loose and rather offensive motions a day. The blood showed a moderate microcytic anæmia.

Nicotinic acid was begun in large doses by mouth on Aug. 7, and some improvement in the mental state was already noticeable by Aug. 13 when she was transferred to West Park Hospital. As the depression gradually lessened she became more alert and responsive and the delusional ideas faded. Incontinence and diarrhœa disappeared promptly and a good appetite replaced her diffidence about food. The rash faded more gradually but the patient regained strength and put on weight. She was discharged from hospital on Oct. 14, having made a complete recovery, mentally and physically.

CASE 12.—A married woman, aged 63, admitted on Aug. 15, 1942, in a state of mental confusion. No family or past history of mental disorder. She had pneumonia a year before admission and had never seemed really well since. In May, 1942, she developed a chill, had indigestion, had a very sore mouth and could not walk properly. She "staggered about and did not know if she was walking backwards." Hysterical paralysis is said to have been diagnosed. Later, she "developed violent diarrhœa, lay on a rubber bed-pan for weeks." Despite careful nursing a bedsore appeared and the patient became critically ill. She had "severe attacks of rigidity." She developed mental symptoms—she wandered in her mind, was disoriented, thought she was being poisoned and refused food. A dermatitis was said to have been present over the hands for two months. Seen by another physician, she was diagnosed as pellagra and nicotinic acid was prescribed. The diarrhœa improved, the dermatitis cleared and her general condition seemed better. The patient's mental state, however, necessitated removal to observation ward.

She was then confused, sleepless, restless, faulty in habits and incontinent of urine and fæces. She was disoriented in time and place, her memory was faulty and she was unable to give a simple rational account of herself. At times she imagined she was at an hotel, at other times that she was at her own home. Her general health was impaired and she had a large sacral bedsore. She was too weak to get out of bed. There was no pellagrous rash but some atrophy of the lingual papillæ was noted and the tongue was tremulous when protruded. CNS otherwise appeared normal.

She became extremely excited and despite nicotinic acid therapy lapsed into an exhausted condition and died on Aug. 31.

COMMENT

No mention has been made of the formes frustes of the B group vitamin deficiencies. In view of the relatively large number of cases of frank pellagra encountered, it is reasonable to suppose that potential cases of pellagra and subpellagrous cases exist in even larger numbers. A careful vigilance and study is being undertaken not only among the chronic patients but also among newly admitted patients at the hospital and at the observation unit. It seems more than likely that "atypical psychotic states which respond to nicotinic acid,"[11] the states of acute nicotinic acid deficiency[12] as well as cases of Wernicke's syndrome have been ill-understood and overlooked in the past, and will continue to be overlooked unless more attention is given to this important aspect of psychiatry.

SUMMARY

The main clinical features of 10 cases of pellagra encountered among chronic psychotic patients, and the results of treatment with nicotinic acid, are summarised. The probable ætiological factors were faulty habits of feeding, Flexner's dysentery, and improper and inadequate dietary.

Two cases of the disease, admitted to an observation ward with psychotic symptoms, are also described.

A plea for the study and recognition of the B group of vitamin-deficiency syndromes is urged, particularly with regard to their relationships to psychiatry.

I wish to thank Dr. W. D. Feldman, medical superintendent of St. Pancras Hospital, and Dr. W. A. Caldwell, medical

superintendent of West Park Hospital, for permission to publish these cases.

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Medical Societies

ROYAL SOCIETY OF MEDICINE

THE section of orthopædics met on June 26, with Mr. B. H. BURNS, the president, in the chair, at Princess Mary's RAF Hospital, where a symposium had been arranged on

War Wounds, Fractures and Burns

Squadron-Leader J. C. SCOTT, describing the *emergency treatment of wounds*, said that the general standard of organisation and treatment leaves much to be desired; the accepted principles of treatment still need to be disseminated. Treatment can be divided into two parts: the approach to the patient and to the wound. At the first examination it is important to note the exact time of the injury; much valuable clinical and scientific information is being lost because of failure to do this. The cause of the injury should be recorded—if, for example, the cause was a mortar-bomb splinter, the surgeon operating will know that despite the small skin wound he must expect extensive underlying tissue disruption. The patient's general condition should not be assessed by a rapid examination of the pulse or by that unknown quantity clinical judgment. The best guide is a series of blood-pressure readings. The patient's mental state should be recorded. The principles of first-aid treatment are control of hæmorrhage, infection and pain. A sterile dressing with sulphanilamide powder should be applied, with adequate splintage. The wound should be surgically dealt with as soon as the patient's general condition permits. When there are a lot of casualties sorting is particularly important; it is difficult, and a senior member of the team should be responsible for it. Before operation the surrounding skin is cleaned with soap and water, the surgeon wearing sterile gloves. The skin is then painted up to the edge of the wound with an antiseptic, and the wound towelled off. The surgeon puts on a gown, fresh gloves, washes the wound with soap and water, and excises devitalised tissue carefully, layer by layer. Soap and water are kept handy and used when necessary. The wound is not to be treated as if it was some malignant growth and a block excision performed. In civilian types of injury operated on within 6 hours, and, where there is no tension, the skin can be sutured; deep sutures to close a joint or approximate ends of divided nerves are then permissible. War wounds should not be sutured. For drainage a dry close-mesh bandage is packed into the wound, making sure that it reaches the interstices. Counter drainage is necessary in many cases. The limb should be immobilised in plaster; if padding is employed there should be no wool near the wound, for this interferes with the suction drainage effect of the plaster. The plaster should be split whether padded or not. Sulphonamides are used as an aid to surgery. In wounds of the fingers and toes, active movements are needed from the beginning.

Mr. A. H. McINDOE discussed *skin-grafting of wounds*. Early application of a skin-graft to a wound is as important as the early immobilisation of a wound; otherwise contraction and deformity, sloughing or fixation of tendons, and periarticular fibrosis may follow. The progress of fibrosis is reversed as soon as a skin-graft is applied. Intact skin is the only barrier to infection. A temporary graft—even if not of the most suitable type—can be replaced later by a different type and will save much deformity and even years of suffering. In superficial injuries of the face, or compound fractures, grafts can often be applied immediately, and later deformity and defects repaired by appropriate plastic measures. Even with 24 hours delay it is possible to skin-graft face wounds. In burns, where early grafting is particularly desirable, it is impossible in most cases to tell whether there is a 2nd or a 3rd degree burn. In the localised 3rd degree burn it is sometimes possible to do an excision followed by immediate grafting. The take of the delayed graft is handicapped by sepsis, sloughs, inspissated pus, trauma, bad dressings, and the fibrous layer that follows delay. Under a plaster granulation tissue flourishes but not epithelium. As soon as a plaster cast has served its purpose it should be discarded. In certain areas the grafting of even a square inch of skin early is particularly important—on the lower eyelid if ectropion is to be avoided, on the backs of the fingers to nts, over tendons which will oid fibrosis in a wound, speed the graft is essential; grafting s to be aimed at. Granulating surfaces inside plaster usually require a further 7 days, although grafting is occasionally possible immediately the plaster is removed. Thiersch grafts are usually employed, but in certain large areas such as the buttocks the seedling type of multiple graft (Reverdin) is better. Where a large area of skin has been avulsed or is only loosely attached, it is advisable to clear it of its fat and reapply it as a Wolfe graft. For large skin and bone defects, say of the tibia, a cross leg flap from the other side can be used.

Air-Commodore H. OSMOND CLARKE, speaking of *infected fractures and non-union*, said an infected fracture may mean sinuses, sequestra, and often years of recurring abscesses. A quarter of infected fractures are said to go on to non-union. Infection delays union—if non-union results, adequate uninterrupted immobilisation of the fracture has not been carried out. Most surgeons agree that the closed plaster and adequate drainage, without repeated dressings, have given the best results. Tube drains, sinus forceps, probes, and the breathing of organisms on to the wound during dressings are all eschewed these days in wound treatment. Adequate drainage implies a free laying open of the skin down to the fracture. Soft paraffin or plain gauze (it does not matter which) is used to "pack," the wound; packing is an unfortunate term, for it is really a mere light laying in of gauze to keep the wound open. Sequestra or other foreign bodies delay union by causing a local hyperæmia with decalcification. Sequestra should be removed early with the least possible local damage or disturbance; no chiselling or gouging or spoon curetting is to ow quickly union often tions to this early remov between the bones this will keep the bones apart; otherwise the periosteal tube collapses, lies between the fragments, and

in association with burns, a particular problem in aero plane crashes. Such cases should be taken at once to the nearest hospital. The burnt areas should be cov with sterile dressings, and no attempt made to adherent clothing. For the fractured femur, a Thomas splint with shoe-clip traction or clove hitch is used as a first-aid measure. The ankle and foot are rarely burnt being protected by the flying boots. The badly patient is often unaware of his other injuries, fractures of the spine, malar bone and foot are missed. Repeated blood-pressure and hæmoglobin examinations should be used as a control of the resuscitative measure, and vigilance should not be relaxed for 48 hours. Reduction of the fracture adds to the shock; it is often advisable to be content with a poor anatomical picture and repeat the manipulation later. An anæsthetic is not needed for cleaning the burn; deep burns are quite insensitive. CTAB in 1% watery solution is the cleansing agent used. After "frosting" with a sulphonamide powder, the burn is covered with tullegras, firm pressure bandaging is applied and the affected area elevated. Anæmia is particularly common in these complicated cases and if the hæmoglobin is below 65% will delay healing. Toxæmia of burns is rare; the principal cause of death is infection. Swabs are taken at every change of dressing. Penicillin is highly effective against the sulphonamide-resistant streptococcus and *Staph. aureus.* Sulphacetamide powder ('Albucid') has been found effective against *B. pyocyaneus.* The local use of sulphanilamide powder is not without risk—in one case the blood level was 15 mg. per 100 c.cm. The less soluble sulphathiazole is safer in such cases. He did not advise routine administration of sulphanilamide by mouth. The aim in the 3rd degree burn is to graft as soon as possible; by the fourth week the surface should be ready. The 2nd degree burn is already healed by this time. For a large area the most suitable method of grafting is to lay the sheet skin-graft on tullegras, cut this up into small squares and apply the squares ¼ inch apart. The whole area is usually healed within 10 days. The best way of immobilising the fracture has to be decided for each case. Pins must not be passed through burnt areas. A living patient with bent bones is better than a dead patient with straight.

Flight-Lieutenant C. M. SQUIRE discussed *contractures of toes and fingers after war wounds.* Digital contractures may follow muscle spasm, damage to soft tissue, including muscle and nerve, or bone and joint injury, particularly when the wound is infected. Gravity plays a part in producing contractures of the toes, as does prolonged local swelling. Prevention is by the effective treatment of local causes, especially by proper immobilisation to relieve muscle spasm; proper surgical treatment of wounds; measures to control infection with full use of skin-grafting; early and accurate reduction of fractures; elevation in the early stages and avoidance of prolonged dependency in the later ones; correct plaster or splinting technique. The foot-piece commonly used to support the toes in plaster is as bad as splinting the fingers, and contractures will result if full toe flexion is restricted. Determined, sustained and very frequent active movements of all joints are necessary as soon after injury as the local condition permits. Where active movements cannot be performed, the joints should be put through their full passive range of movements twice a day. In the RAF, orderlies ensure that for 5 minutes in every hour of the day every suitable patient performs suitable exercises. When muscle power is insufficient to maintain a neutral position splintage is necessary. Detachable splints made from felt and plaster, with rubber tubing traction bands, are used; these permit a low-tension elastic pull against the deformity. All patients should acquire a "joint conscience"—appreciate the need for determined activity of all their fingers and toes.

Flight-Lieutenant E. W. SOMERVILLE described his experience with *air arthrography in the diagnosis of internal derangement of the knee.* He has used a technique modified from that described by Cullen and Chance in 30 cases. After 24 hours skin preparation, 80–120 c.cm. of air filtered through cotton-wool is injected into the knee-joint with a syringe and needle. A firm bandage is then applied over the suprapatellar pouch; three glancing views of each cartilage are taken and finally a lateral view with the knee in full flexion. During the X ray the side of the joint to be examined is opened as much as possible. A curved casette is employed. Out of the 30 cases, 21 came to operation. In 15 the lesion accurately corresponded with the diagnosis. In 3 the arthrograms were useless owing to excess fluid obscuring the cartilage. Severe reactions were seen in 8 of the cases, slight in 6. The reactions were most marked in the cases where fluid was present at the time. The conclusion was that a lesion of menisci can be diagnosed by this means; a negative arthrogram throws doubt on the validity of the diagnosis.

Prof. H. J. SEDDON urged that there is a need to concentrate more on getting wounds to heal quickly. We know how to control infection, and we know the simple principles of wound treatment—but they are not being practised. Patients are arriving at his peripheral nerve centre 6–10 months later with wounds only just healing or healed.

Mr. R. W. WATSON-JONES summed up the lessons of the meeting. We should no longer put our fingers on the pulse, assume a learned look and say "fit for operation"; we must rely more on the blood-pressure. The infected fracture does not necessarily fail to unite immobilise it continuously, without any single inte ruption, and it will unite. Sequestra prolong infection only with a whole thickness sequestrum should remov be delayed. Early skin-grafting should be the ain In all infected and other fractures digital exercises a imperative if contraction is to be avoided.

Reviews of Books

Scabies

KENNETH MELLANBY, PH D, Sorby research fellow, Roy Society; hon. lecturer in zoology, University of Sheffiel (Oxford University Press. Pp. 81. 5*s.*)

THIS monograph, the result of much careful work a observation, is for the moment the last word on a mu discussed subject. It should be considered in conjun tion with the film,[1] on which Dr. Mellanby advised, now being shown to medical audiences throughout the country. There are points, however, on which the experimental investigator and the clinician may differ. First Dr. Mellanby is convinced that in every case of scabies the burrow may be found if carefully looked for: but many experienced dermatologists believe that there are cases of undoubted scabies where the burrow is so difficult to find that for practical purposes it may be said not to exist. In these a firm diagnosis can usually be made on other grounds such as the almost invariable presence of a papule on the penis or the triangular area of papules on the lower part of the buttocks which is scarcely never absent. There is also the vexed question of fomites, and many will doubt the wisdom of not sending bedding and underclothes to be disinfested. The long period between infection and the first symptoms is stressed, a point overlooked in the past. Mellanby considers the time-honoured sulphur ointment treatment best for self treatment, and gives a high place to mesulphen ('Mitigal')—unobtainable during the war, but probably the best treatment of all in that it never produces dermatitis. He considers that benzyl benzoate should be used only when it can be applied by a trained nurse or orderly; many failures have been reported with this substance when it has been given to patients for home use.

Psychopathology

(3rd ed.) J. ERNEST NICOLE, LMSSA. (Baillière. Pp. 265. 15*s.*)

THIS convenient guide suffers in a way from the author's efforts to keep it up to date; some of the additions seem more appropriate to a catalogue or bibliographical index than to "a general survey of the conceptions and views of the different schools" which was the main purpose of the book. The tiro for whom it is intended learns nothing useful from such a passage as: "General blood studies in schizophrenia (Jedlowski) and in mental disease at large (Looney and H. Freeman), cerebral ischæmia (Pickworth, Krapf), heat regulation in schizophrenia and essential hypertension in the psychoses (Riemer) are other topics that have come to the fore of late, as also autonomic integration (Rheingold) and psychogenic leucocytosis (Wittkower and others)." Had a more critical attitude been adopted, especially towards work of mainly historical interest, the book would be more compact and balanced: thus it is questionable whether the views of Burridge, Rivers, Kempf and Berman now deserve as much space as they receive. Much that is not usually included under psychopathology is reported, and there are few recent lines of work in psychiatry that are not mentioned.

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[1] See *Lancet*, April 3, p. 437.

THE LANCET

LONDON: SATURDAY, JULY 10, 1943

FEEDING THE WORLD

ONE *of the first jobs of peace will be to revictual* Europe. The work will begin as soon as any of the enemy-occupied countries are liberated, and stable portable foods such as cereals, fats, sugar and dried milk are likely to be imported to tide over the critical emergency period. The next step will be to provide the countries with more palatable and perhaps more perishable foods, with seeds and fertilisers and the means to build up once more their herds of live stock. These are tasks well within the powers of the United Nations, and there is every reason to suppose that they will be accomplished and that the status quo will be restored within say two years of the cessation of hostilities. But what next? The conference at Hot Springs which has just ended discussed the future food-supplies of the world and their production. It has been suggested that the goal before such conferences should be to ensure enough of the right kind of food for everyone at all times.[1] Headline prominence was given to a formal resolution that the United Nations should ensure as an act of common humanity a supply of protective foods sufficient to bring children everywhere to full maturity. But it is a far cry from Hot Springs to Hong Kong, the Kangra Valley[2] or the Gold Coast. There are millions in India, Africa and China who have never known anything but malnutrition and semi-starvation, yet it is rash to assume that these people will welcome the proposals of the planners for plenty. Even educated people distrust new foods and dislike having their diets changed: much more so the ignorant. It is useless to import dried milk into a country till a demand for it has been created. People who have always lived largely on rice will not be able to eat up other people's surpluses of wheat, even if they are willing, until they can mill it and know how to prepare it for the table. *In some countries, too, there* must eventually be difficulties arising from lack of exportable goods which will enable them to pay for nutritious imports. Industrialisation has been put forward as the real solution for the millions living on land from which they cannot wrest adequate nutrition for themselves.[3] But is this any solution? Possibly for the starving million which is industrialised, but not for the rest of the world if we may judge by the effects which the Japanese turnover to industry has had on the Lancashire cotton mills. An additional difficulty is that in the more philoprogenitive nations an increase of food is apt to mean an increase of population which tends to bring the people down again to the bare subsistence level. The population of India, under a regime which has limited famine, pestilence and internal war, has increased by 50 millions in the last decade.[4]

The present proposals may seem a little utopian even thirty years from now. Freedom from want is a fine ideal, but freedom from malaria and freedom from syphilis are equally desirable, and we know that they cannot be swept away merely by the distribution of surplus mepacrine or NAB. Such a proposal might reasonably have been made about syphilis thirty years ago, but we have learned our lesson since then, and our limitation. In 1918 people thought the millennium had set in; tragic thoughts they seemed twenty years later. But are we much wiser today? The end of this war will not see the return of the Golden Age, any more than did the end of the last. The world is faced with rising populations, and the sources of power at present chiefly used—namely, coal and oil—are far from inexhaustible. We need not pretend that the world is going to live on *Anglo-American food, nor should we encourage* Canadian farmers to count on some beneficent deity paying them dream prices for their surplus wheat. We cannot shut our eyes to the laws of supply and demand. Nevertheless it would be a policy of defeatism to regard it as natural law and to assume that what has been must be. Much can be done by the *study of local diets and local agriculture to find out* how best they can be readjusted and improved with the minimum of economic and cultural disorganisation. This may look too modest an aim but it seems the most likely to produce lasting results.

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[1] *Times*, May 28, 1943.
[2] Wilson, D. C. and Widdowson, E. M. *Ind. med. Res. Mem.* 1942, No. 34.
[3] *Times*, June 1, 1943.
[4] Brander, J. P. *Ibid*, July 1, 1943.

SULPHONAMIDE RESISTANCE

EVER *since the early days of chemotherapy, it has* been known that pathogenic organisms can gradually develop a resistance against the specific chemical compounds which have been designed to kill them, and this phenomenon, as exemplified by the arsenic-fastness of trypanosomes, was studied in detail by EHRLICH. When sulphonamide compounds were *introduced for therapeutic use, it was soon discovered* that an analogous condition of sulphonamide resistance could be produced in susceptible bacteria. This resistance may develop in pneumococci, gonococci, dysentery and coliform bacilli, and less readily in streptococci; and some of the failures of sulphonamides may be due to its presence, either as a congenital attribute or acquired gradually during the course of treatment.

An organism which has become resistant to one sulphonamide is correspondingly resistant to all th others, suggesting that a common factor is involved i all cases. Since it is now well established tha sulphonamides exert their antibacterial action b interfering with the germ's consumption of *p*-amino benzoic acid, this compound seems likely to be involve in the affair, but until recently attempts to prove thi hypothesis have yielded little result. LANDY and hi colleagues[1] have now provided strong evidence i favour of this explanation. They have devised microbiological test for the presence of *p*-amino benzoic acid, employing an organism, *Acetobacte suboxydans*, which requires it for normal growth This organism is cultured on a synthetic medium which contains all the necessary constituents excep *p*-aminobenzoic acid, and in this way the presence and amount of the acid in material added to the medium for testing can readily be assayed. These workers made four strains of *Staph. aureus* resistant to sulphathiazole and then compared the amount of *p*-aminobenzoic acid produced in cultures of the resistant strains with that present in cultures of the parent sensitive strains. The sensitive strains produced only traces (e.g. 0·042 μg. per c.cm. of the culture fluid) while the resistant strains produced over 70 times as much (e.g. 3·2 μg. per c.cm.), which is more than is needed quantitatively to account for the resistance shown to sulphonamides. Confirmation of this production of *p*-aminobenzoic acid was obtained by direct chemical estimations using the Litchfield-Marshall test. Accordingly it is concluded that the development of sulphonamide resistance in staphylococci is due to some change in the metabolism of the bacteria leading to a greatly increased manufacture of *p*-aminobenzoic acid, this change in the metabolism being transmitted to subsequent generations of the organisms apparently as a permanent characteristic; more likely, perhaps, this is an example of the survival of the fittest.

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[1] Landy, M., Larkum, N. W., Oswald, E. J. and Streightoff, F. *Science*, 1943, 97, 265.

This explanation of sulphonamide resistance is very satisfactory theoretically, and is supported by strong evidence in the case of staphylococci, but its immediate application to other resistant bacteria would be premature since some discrepancies still remain to be reconciled. For one thing, STOKINGER and others [2] found that sulphonamide-resistant gonococci contain more *p*-aminobenzoic acid than the parent strains (thus anticipating the work of LANDY and his co-workers): but since the resistance could not be inhibited by azochloramide, which inhibits *p*-aminobenzoic acid, they concluded that the increased production of this substance was not responsible for the resistance observed. Secondly, LANDY and his colleagues find that when other organisms (coliform and dysentery bacilli, pneumococci, &c.) are made resistant, they do not manufacture greater amounts of *p*-aminobenzoic acid than they did in their original sensitive condition. The mechanism of sulphonamide-resistance may therefore be more complex than this hypothesis suggests. However, presuming that the work of LANDY and his associates is confirmed (as seems likely), sulphonamide resistance in staphylococci may instructively be contrasted with the arsenical-resistance of trypanosomes. Normal trypanosomes absorb organic arsenical compounds from the surrounding fluid with great avidity, so that the arsenical is concentrated in their protoplasm and the parasites are poisoned; in resistant trypanosomes this tendency to absorb the arsenical is greatly diminished. The growth of normal staphylococci is checked by sulphonamides which hinder their accustomed consumption of *p*-aminobenzoic acid; resistant staphylococci overcome this obstruction by a greatly increased manufacture of the substance which they need. In each case the defensive tactics of the germ are adapted to counteract the type of chemotherapeutic attack which it has to face.

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[2] Stokinger, H. E., Charles, P. C. and Carpenter, C. M. *J. Bact.* 1942, 44, 26.

THERE will be a meeting of the Association of Scientific Workers at 7 PM on July 11 at Birkbeck College, Breams Buildings, E.C.4, to discuss the scientist's part in the Allied war effort and exchange greetings with Soviet scientists who will be discussing the same subject at the same time in Moscow. Sir Robert Watson-Watt will take the chair and speakers will include Professor Sarkisov, of the Moscow Research Institute of the Brain, Prof. J. D. Bernal, Sir Alfred Webb-Johnson and Mr. J. G. Crowther.

PELLAGRA AND MENTAL DISORDER

DERMATOLOGISTS and psychiatrists generally have regarded pellagra as very rare in England,[1] and fortunately it has never been endemic here. But just before the war sporadic cases were being reported by STANNUS [2] and others, and the feeling was growing that many other cases were going unrecognised.[3] On an earlier page HARDWICK cites authorities who have taken this view, and SINCLAIR [4] who is among them has said that "it occurs most frequently in patients with ulcerative colitis or in mental hospitals." In the United States the disease has been studied mainly by SYDENSTRICKER in Georgia, SPIES in Cincinnati, and JOLLIFFE & GOODHART in the alcoholic wards of the Bellevue Hospital. The visits of these workers to Great Britain during the past five years have increased our interest in and recognition of the disease. R. GOODHART, who worked in Oxford for a year before the war, saw pellagra in a tramp in a London bus soon after he reached England. SYDENSTRICKER, who has been attached to the Ministry of Health for a year, visited many mental hospitals, including West Park, from which HARDWICK reports his 10 cases of pellagra.

The cardinal signs are the well-known triad, diarrhœa, dermatitis and dementia. The diarrhœa is a manifestation of the disorder affecting the whole gastrointestinal tract, of which the sore smooth scarlet tongue and the atrophic gastric mucosa and achlorhydria are also a part. Glossitis, achlorhydria and diarrhœa caused by lack of niacin (the new name for nicotinic acid sponsored by the American National Research Council [5]) lead in turn to diminished intake, absorption and utilisation of the vitamin, so that a vicious circle arises. Again, dementia causes feeding difficulties, and hence vitamin deficiencies and added mental disturbance. The psychic manifestations, as SYDENSTRICKER [6] remarks, can simulate neuroses and most of the well-known functional, toxic and organic psychoses. Both in primary attacks and in relapses they may precede any other manifestations by months. The early symptoms are similar to those produced experimentally by deficiency of thiamine (vitamin B_1),[7] including lassitude, apprehension, mental retardation, depression and loss of memory for recent events; but in the pellagrin these symptoms respond to therapy with niacin and not with vitamin B_1. Continued deficiency leads to disorientation, hysterical and confusional states, and even mania; profound depression or paranoia may develop and usually do not respond to therapy. Obviously therefore the condition should be recognised, and treatment should begin, before irreversible structural damage has been done to the brain.

SYDENSTRICKER attaches even more importance to acute "aniacinosis." There may be a short period of confusion, and then an abrupt onset of delirium, hallucinations or mania. On administration of niacin, recovery may be complete in 24 hours. Such cases are much commoner than is supposed, and the con

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2. Stannus, H. S. *Brit. med. J.* 1939, i, 950.
3. *Lancet*, 1940, ii, 594.
4. Sinclair, H. M. Whitla's Pharmacy, Materia Medica and Thei peutics, London, 1939. *Practitioner*, 1941, 146, 109.
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dition may follow fever, infection or intravenous infusions of glucose Stuporous or encephalopathic states are produced by severe—but possibly less acute—deficiency of niacin, and cerebral thromboses or uræmia may provisionally be diagnosed when the patient is brought unconscious to hospital This condition is closely related to Wernicke's disease, many of whose manifestations respond to niacin But Wernicke's syndrome, like pellagra itself, is often accompanied by deficiency of other members of the vitamin-B complex Both may be associated with a peripheral neuropathy that is almost certainly due to deficiency of thiamine (B_1)

That deficiency of thiamine can produce peripheral neuropathy has not been universally accepted, MEIKLEJOHN[8] regarding it as possible that the true antineuritic vitamin has yet to be discovered SINCLAIR,[9] who believes that it can do so, explains the absence of neuropathy in volunteers on thiamine deficient diets by the acute nature of such deficiency This view is supported by the work of WILLIAMS and his colleagues,[10] who placed 2 volunteers on such a diet and gave them 1 mg of thiamine by injection once a fortnight Symptoms and signs of deficiency appeared after a month, and polyneuropathy was "clearly apparent" after 110 days of restriction The condition responded to administration of large doses of thia[illegible] out, [illegible] appli[illegible] Moreover, administration of one member of this complex may precipitate signs of deficiency of others Therefore therapy must not in general be restricted to one pure vitamin But for the immediate treatment in the psychoses of niacin deficiency, it is essential to administer that substance at once, and wise to use large doses SYDENSTRICKER[6] advises 100 mg of niacin (se nicotinic acid) every hour for 10 hours during the first 2 days, and says that most patients improve greatly within 48 hours of the beginning of treatment

Annotations

GASTRIC BLEEDING FROM ASPIRIN

FIVE years ago Douthwaite[11] described the case of a middle aged doctor who had severe melæna 4–5 hours after taking two gr 5 aspirin tablets dry before breakfast to relieve his neuritis He had had his alimentary tract X rayed and a test meal and blood count done a few days before as a precautionary measure—he had no indigestion—and these had shown no abnormality except hyperchlorhydria Twelve days after the bleeding X rays again showed a normal alimentary tract Douthwaite and Lintott[12] later gastroscoped 16 patients after they had swallowed three crushed aspirin tablets in an ounce of water, and compared the appearances with those in 5 patients who had swallowed barium sulphate In 13 patients the aspirin produced a localised inflammatory reaction, ranging from slight to intense hyperæmia and even submucous hæmorrhage, no reaction was seen after barium sulphate There was no apparent relation between the reaction produced and the gastric acidity or type of gastric mucosa A similar hyperæmia was produced in 2 patients given salicylic acid Next 3 patients were given gr 15 of calcium acetylsalicylate in 3 the drug had dissolved so well that no particles were seen and there was no mucosal reaction, in the other 2 some particles were seen, and one of these patients showed a slight localised hyperæmia Hurst and Lintott[13] published a striking example of the irritative effect of aspirin in a sensitive subject A man of 57 had two severe attacks of melæna and one of hæmatemesis as well as other attacks suggestive of internal bleeding, over a period of 13 years Three months after the last attack no evidence of ulcer blood disease or other organic cause for the bleeding could be found But the man had been taking at least 6 aspirin tablets a week, and sometimes 6 a day, often uncrushed and without water, for 10 years to relieve his migraine Gastroscopy was performed immediately after he had swallowed two aspirin tablets, broken but not crushed, within a few minutes the mucosa around the fragments became intensely hyperæmic, and extravasated blood was seen staining the fragments red There was no further bleeding when aspirin and salicylates were forbidden Lately Hurst[14] has suggested that the label of every bottle of aspirin tablets should carry instructions that they must be taken powdered and after food, with gr 10 as the maximum dose, he says that if these rules were adhered to the incidence of hæmatemesis and melæna in the absence of chronic ulcer, would be reduced by about 50%, and the total incidence by 15–20% Considering the vast number of aspirin tablets now taken, the risk is small, but there can be no doubt that it does exist Unfortunately it is commonly believed, probably rightly, that aspirin relieves pain quicker when taken on an empty stomach and even a glass of milk will be shunned during an attack of migraine Tablets containing other ingredients besides aspirin will presumably be similarly irritating but the soluble compounds of aspirin should be safe if thoroughly dissolved, it is a pity that they are often difficult to dissolve and apt to decompose on keeping

THE SCARRED HAND

WOUNDS and burns of the hand still account for a considerable proportion of the cases sent to plastic surgery units for repair At the Middle East unit where Rank[15] worked, for instance, 10% of cases had hand injuries He emphasises the value of early grafting where tissue is lost—as McIndoe said at the RSM meeting reported in this issue, even a temporary graft may save serious deformity A balance has to be struck between rest and activity at the beginning of treatment, for too long immobility leads to intractable stiffness, whereas excessive physiotherapy in the earliest stage provokes a fibrous tissue reaction Rank does not solve this problem for us, but he points out that any attempt to stretch newly formed scar tissue sets up a reactive fibrosis, though friction massage will aid the natural softening of the scar When residual scar contraction interferes with finger function plastic operations are necessary Hand grenade injuries often leave such scarring on the palmar aspect, and for these cases plastic treatment should be begun as soon as the reactive stage is over A full thickness graft provides good skin, a razor graft is useless because of its inveterate tendency to contract on a flexor surface, and a flap is too bulky It is important to see that the edge of a Wolfe graft is so placed as to avoid reproducing the scar deformity In dorsal wounds tendons are often involved in the scar For effective tenolysis and tendon repair a flap of skin with subcutaneous tissue, from the abdominal wall, is usually required The technique has been carefully described by Gillies[16]

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8 Meiklejohn A P New Engl J Med 1940 223 265
9 Sinclair H M Proc R Soc Med 1943, 36 172
10 Williams R D Mason H L Power M H and Wilder, R M Arch int Med 1943 71 38
11 Douthwaite, A H Brit med J 1938 i 1143
12 Douthwaite A H and Lintott, G A M Lancet, 1938 ii 122

A M Guy's Hosp Rep 1939 89 173
i p 768
Surg 1943 12, 191
16 Gillies, H D Brit med J 1932, ii 1008

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FIVE years ago Douthwaite[11] described the case of a middle-aged doctor who had severe melæna 4–5 hours after taking two gr. 5 aspirin tablets dry before breakfast to relieve his neuritis. He had had his alimentary tract X rayed and a test-meal and blood-count done a few days before as a precautionary measure—he had no indigestion —and these had shown no abnormality except hyperchlorhydria. Twelve days after the bleeding X rays again showed a normal alimentary tract. Douthwaite and Lintott[12] later gastroscoped 16 patients after they had swallowed three crushed aspirin tablets in an ounce of water, and compared the appearances with those in 5 patients who had swallowed barium sulphate. In 13 patients the aspirin produced a localised inflammatory reaction, ranging from slight to intense hyperæmia and even submucous hæmorrhage; no reaction was seen after barium sulphate. There was no apparent relation between the reaction produced and the gastric acidity or type of gastric mucosa. A similar hyperæmia was produced in 2 patients given salicylic acid. Next 5 patients were given gr. 15 of calcium acetylsalicylate; in 3 the drug had dissolved so well that no particles were seen and there was no mucosal reaction; in the other 2 some particles were seen, and one of these patients showed a slight localised hyperæmia. Hurst and Lintott[13] published a striking example of the irritative effect of aspirin in a sensitive subject. A man of 57 had two severe attacks of melæna and one of hæmatemesis as well as other attacks suggestive of internal bleeding, over a period of 13 years. Three months after the last attack no evidence of ulcer, blood disease or other organic cause for the bleeding could be found. But the man had been taking at least 6 aspirin tablets a week, and sometimes 6 a day, often uncrushed and without water, for 40 years to relieve his migraine. Gastroscopy was performed immediately after he had swallowed two aspirin tablets, broken but not crushed; within a few minutes the mucosa around the fragments became intensely hyperæmic, and extravasated blood was seen staining the fragments red. There was no further bleeding when aspirin and salicylates were forbidden. Lately Hurst[14] has suggested that the label of every bottle of aspirin tablets should carry instructions that they must be taken powdered and after food, with gr. 10 as the maximum dose; he says that if these rules were adhered to the incidence of hæmatemesis and melæna, in the absence of chronic ulcer, would be reduced by about 50%, and the total incidence by 15–20%. Considering the vast number of aspirin tablets now taken, the risk is small, but there can be no doubt that it does exist. Unfortunately it is commonly believed, probably rightly, that aspirin relieves pain quicker when taken on an empty stomach and even a glass of milk will be shunned during an attack of migraine. Tablets containing other ingredients besides aspirin will presumably be similarly irritating, but the soluble compounds of aspirin should be safe if thoroughly dissolved; it is a pity that they are often difficult to dissolve and apt to decompose on keeping.

THE SCARRED HAND

WOUNDS and burns of the hand still account for a considerable proportion of the cases sent to plastic surgery units for repair. At the Middle East unit where Rank[15] worked, for instance, 10% of cases had hand injuries. He emphasises the value of early grafting where tissue is lost—as McIndoe said at the RSM meeting reported in this issue, even a temporary graft may save serious deformity. A balance has to be struck between rest and activity at the beginning of treatment, for too long immobility leads to intractable stiffness, whereas excessive physiotherapy in the earliest stage provokes a fibrous tissue reaction. Rank does not solve this problem for us, but he points out that any attempt to stretch newly formed scar tissue sets up a reactive fibrosis, though friction massage will aid the natural softening of the scar. When residual scar contraction interferes with finger function plastic operations are necessary. Hand-grenade injuries often leave such scarring on the palmar aspect, and for these cases plastic treatment should be begun as soon as the reactive stage is over. A full thickness graft provides good skin; a razor graft is useless because of its inveterate tendency to contract on a flexor surface, and a flap is too bulky. It is important to see that the edge of a Wolfe graft is so placed as to avoid reproducing the scar deformity. In dorsal wounds tendons are often involved in the scar. For effective tenolysis and tendon repair a flap of skin with subcutaneous tissue, from the abdominal wall, is usually required. The technique has been carefully described by Gillies.[16]

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[8] Meiklejohn, A. P. *New Engl. J. Med.* 1940, 223, 265.
[9] Sinclair, H. M. *Proc. R. Soc. Med.* 1943, 36, 172.
[10] Williams, R. D., Mason, H. L., Power, M. H. and Wilder, R. M. *Arch. int. Med.* 1943, 71, 38.
[11] Douthwaite, A. H. *Brit. med. J.* 1938, i, 1143.
[12] Douthwaite, A. H. and Lintott, G. A. M. *Lancet*, 1938, ii, 1222.
[13] Hurst, A. F. and Lintott, G. A. M. *Guy's Hosp. Rep.* 1939, 89, 173.
[14] *Brit. med. J.* June 19, 1943, p. 768.
[15] Rank, B. K. *Aust. N.Z. J. Surg.* 1943, 12, 191.
[16] Gillies, H. D. *Brit. med. J.* 1932, ii, 1008.

Petersen[17] describes a method for reconstructing a thumb from which a portion has been lost by means of a tube pedicle from the abdomen into which a bone-graft is subsequently inserted.

Burns, whether in soldiers, airmen or civilians, tend to follow a common pattern with the maximum destruction of skin on the dorsum. The early treatment may make or mar the final result, and the speed with which damaged skin can be replaced by grafting is of paramount importance. Yet in the most ideal circumstances there is apt to be some contraction of the skin which may later have to be made good by grafting. In most cases good results are obtained by razor grafts or dermatome grafts; an abdominal flap is rarely called for. After the more severe burns contractures of joints are common, the most characteristic being loss of flexion at the metacarpophalangeal joints and loss of extension at the interphalangeal joints. Hyperextension at the metacarpophalangeal joints is the worst deformity of all, and is liable to be accompanied by changes in the shape of the bone ends. Preservation of the position of function throughout the period of healing is the greatest single measure in the prevention of these deformities. The wrist should be in slight dorsiflexion, says Bodenham,[18] the fingers in mid-flexion at all joints, the thumb in apposition with the tip of the index finger, and the long axis of the fingers pointing towards the lower end of the radius. Occasionally a plaster-of-paris cast may be permissible for one to two weeks only—in cases that cannot be controlled by other means—with suitable precautions to prevent syndactyly. Elevation of the hand allows the fingers to drop into a natural position. A splint intended to keep the hand flat on the bed is an abomination. A skin-graft alone will not restore many of these hands to a functional position, but carefully applied capsulotomy may succeed dramatically. Arthroplasties, though not invariably successful, also have a place. Manipulation is disappointing, and it is doubtful if it should ever be employed. It can rarely overcome stiffness in the small joints, but produces a violent fibrous-tissue reaction, with the last state often worse than the first. By the skilful application of a suitable graft, combined with capsulotomy, many otherwise useless hands can be given some useful function, and many men returned to duty. But prevention should be the aim; speakers at the RSM meeting agreed that the accepted principles of wound treatment are not yet being fully applied. An open type of dressing, rest and elevation in the early stages, active movements as soon as the acute phase is over, with the hand always in the position of function, and early skin-grafting, give the best possible results, and should greatly reduce the need for late reconstructive surgery.

CONTACT LENSES AND THE WOULD-BE PILOT

If a refractive error was merely a problem in optics, lenses ground to fit directly on the eye-ball would offer the ideal means of correcting it. But the man behind the eye-ball likes good vision to be associated with comfort; and contact lenses, like artificial teeth, harass the wearer until time and necessity have worked their usual conjuring trick, and he suddenly realises that he has ceased to be conscious of his appliance. The eye, however, will put up with less than the mouth, so that the incentive needed to carry the patient through to well-earned indifference must be a strong one. Vanity—sometimes said to be the most powerful human motive—is not enough; if ordinary spectacles give good vision the patient usually reverts to them. An eye recovered from a mustard gas burn will tolerate a lens readily because the cornea and conjunctiva have become anæsthetic, but generally speaking, to be worn successfully contact lenses must give good sight which cannot be obtained by other means. In a few cases this holds—notably in conical cornea and irregular astigmatism which cannot be corrected by spectacles. An important new incentive, recently operating, has just received its death blow. Contact lenses are used occasionally in the RAF by members of operational air crews of special skill and experience. Some hint of this in the lay press has led young men with high refractive errors and a powerful urge to fly to present themselves before medical boards wearing contact lenses, in the hope that they would be accepted. The Air Ministry, while sympathising with them, has made it clear that there has never been any idea of accepting candidates with visual acuity below RAF standards; and it is not in the country's interest, unfortunately, that these resourceful patriots should escape detection by the medical boards. No doubt the ministry is right, but it is a pity this strong encouragement to wearers had to die so early a death. The technique of grinding and fitting these contact lenses has improved greatly during the last few years, and makers of them may well feel that the time has now come for patients to try a bit harder.

HALF A CENTURY

Sir John Ledingham, FRS, after 38 years' service, left the Lister Institute on March 31, when Dr. Alan N. Drury, FRS, succeeded him as director. It is now fifty years since the institute began its work, and in war as in peace its record of investigation remains impressive. The report[1] presented by Sir Henry Dale, FRS, to the annual general meeting on June 24 contains little that has not been published, but it draws together much diverse work done—because of the war—in many different places. On the long view, and sometimes on the short view, it is an encouraging report. The first fifty years arouse expectations for the second.

ANÆSTHETIC RECORD CARDS

Figures, they say, can be made to prove anything—but only a statistician can do it. Certainly the collector of statistical data on clinical subjects must step warily and methodically if he is to extract anything more than impressions from them, and where no proper records are kept even honest impressions can be astonishingly unreliable. Nosworthy[2] describes an ingenious indexing card which should help considerably in the systematic recording of the anæsthetist's case-notes and their subsequent analysis. Each essential item in the story has its heading on the card and a hole punched near the edge. In recording, for example, that 'Pentothal' was the anæsthetic used, a note is made under the appropriate heading and the corresponding hole is converted into a notch. When the cards are filed all that need be done to produce, say, those on the pentothal cases is to pass a knitting needle through the pentothal hole and shake the pack, when the desired cards will fall out. To keep even such simple record cards as these will probably require more help than is now provided in the average hospital, and much of their value will be lost unless they are filled up for every case. The system, too, cannot tabulate such imponderables as the dexterity of the surgeon, the competence of the anæsthetist, or the quality of the post-operative nursing, but where these factors can be taken as reasonably constant it should enable the anæsthetist to assess the value of the different anæsthetic agents in his own hands. Above all, it will instil into the anæsthetist a habit of careful and unbiased observation, and make it easy for him to keep an eye on his results.

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[17] Petersen, N. S. *S. Afr. med. J.* 1943, 17, 137.
[18] Bodenham, D. C. *Lancet*, 1943, i, 298.

[1] From the Lister Institute of Preventive Medicine, Chelsea Brid. Road, London, SW1.
[2] Nosworthy, M. D. *Brit. J. Anæsthes.* July, 1943. The card measure 5 in. by 8 in. and can be obtained from A. Charles King, Ltd., 27, Devonshire street, W.1.

Special Articles

WAR-TIME DECLINE OF ACUTE RHEUMATISM

J. ALISON GLOVER, C B E, M D CAMB, F R C P, D P H
TEMPORARY MEDICAL OFFICER (LATE SENIOR MEDICAL OFFICER), BOARD OF EDUCATION

A DECLINE in rheumatic fever has been perceptible for many years. As early as 1030 I ventured to call it an "obsolescent" disease. Generally the health of the nation, despite increases in certain diseases (venereal diseases, tuberculosis, scabies and pediculosis) has well withstood the strain of three and a half years of war, and seems almost better than usual. Even against this background, the behaviour of acute rheumatism is outstanding. While its severity and (less certainly) its incidence had been steadily declining for many years before the war, yet since the war its gradual decline has greatly accelerated—its death-rate¹ has been halved, inpatients are much reduced in number, and a general impression has been received of lessened incidence and clinical severity alike of rheumatic fever, carditis, and

s hard now to realise the
as within living memory.
attack is not its greatest
risk, its mortality is the only available statistical index. The mean death-rate for the 10 years ending 1802 was about 87 per million, or seven times that of 1012. Cases of severe rheumatic fever, with their characteristic odour, were common in hospital wards. In 1852, 11·2% of all
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severity, as well as the incidence, of the disease had declined. By 1901 the crude death-rate per million was 67, and fig. 1 shows that in 1913 just before the last great war, it had fallen to 48.

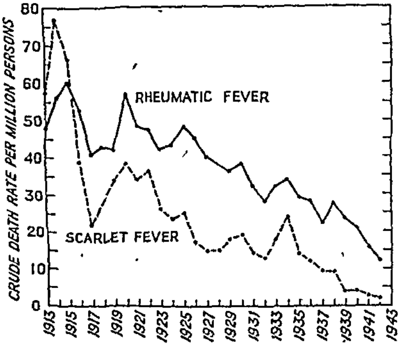

Fig 1—Crude death-rates per million persons from scarlet and rheumatic fevers, showing, over thirty years, the close correspondence between their trends and yearly oscillations.

Increase followed by decline during the last war.—The death-rate rose sharply (56 in 1914 to a peak of 60 in 1915) and then fell as sharply to 42 in 1919. During these war years the male rate slightly exceeded the female, as it did generally before 1910, but in 1920 and in every year since (except 1921 when the rates were equal) the female death-rate has been larger than the male, *a phenomenon probably related to the younger age* distribution of the disease, for we know in peace-time at least that girls and young women are more susceptible to acute rheumatism than

Inter-war years.—The ye
pandemics accompanied l
streptococcal complications, nevertheless showed a "*trough*" *in the curve of the rheumatic fever death-rate,* followed however by a sharp peak (57) in 1020, reflecting the epidemic described by Poynton in that year. For the next six years the death-rate, though fallen from the peak of 1020, continued up, and in 1025 was as high as in 1013, twelve years before. Judged, however, by inpatient admissions these years showed a considerable decline in the disease, for Osman and Close at Guy's found the proportion to total medical inpatients in the five years ending 1926 to be only 1·1% compared with 5·4% for the five years ending 1911 quoted above. Wheatley contrasted the three-year period 1020 to 1022 during which 11 cases of rheumatic fever were admitted to Blackburn Infirmary with 1888 to 1800, during which 100 cases, nearly all of severe type, were admitted. After 1926 there followed a steady decline in the death-rate hardly interrupted by slight remissions in 1034 and 1038, the last year of peace.

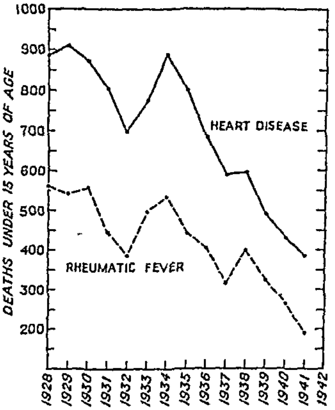

Fig. 2—Actual deaths under 15 years of age from heart-disease and from rheumatic fever, showing the close correspondence and the simultaneous decline, accelerated since 1939.

DECLINE DURING THE PRESENT WAR

In 1039—the year of evacuation—the crude death-rate from rheumatic fever for all ages was 23 per million, the lowest rate but one (21·5 in 1937) so far recorded. In 1910 it moved to a new low record of 20·5. In 1941 it fell to 15·1, and in 1912 to 12·1. When comparing deaths classed to rheumatic fever in the years 1910 onwards with previous years, allowance has to be made for the change in system of selection where another disease was also mentioned on the death certificate, and the rates here given for 1937 and 1939 are the corrected values. The actual number of deaths from rheumatic fever in 1912 was 50; comparison with the corrected deaths in 1938 and 1920 (which were about 1011 and 1900) shows how much swifter has been the relative reduction.

So far only the crude all-ages death-rate per million for rheumatic fever has been used as an index of decline. Fig. 2 gives the actual deaths under 15 years of age for every year since
from heart diseas
that at least nine-
rheumatic heart-
between the two curves. There is also a close correspondence between the yearly oscillations of the crude all-age death-rate, and those of the curve of actual deaths under 15 years.

Bach (1939) gave the percentage of London elementary school-children each year found by school doctors to be suffering from cardiac disease. The average yearly number inspected
were: in 1923, 2·1
and 2 0. In 1927,
began, the percentage found was 1·9, and then in succession, 1 0, 1·9, 1·8, 1·2, 1·2, 1·3, 0·9, 0·8, until, in 1037, the last quoted by Bach, it was 0·77. *In 1938 it was 0·68. If* plotted the curve of these declining percentages corres-

rheumatism in children is in force are, of course, invalidated for statistical purposes by evacuation. Moreover evacuation made futile any comparisons of the number of admissions to medical wards on account of rheumatic fever, or of the proportion these bore to all admissions, with the corresponding prewar figures. In Birmingham, however, there has been, I believe, a considerable decrease in the demand for rheumatic convalescent beds, even since the return to the city of large numbers of evacuated children. In London, where also large numbers have returned, the provisional 1942 figures show, I understand, reductions in admissions to the Council's hospitals for rheumatism (358 in 1942 compared with 2030 in 1938) and in outpatients (733 compared with 1885) at the supervisory centres, reductions too large to be explained by the proportion of children still evacuated or by the remaining restrictions in facilities.

The general opinion of pædiatrists and physicians seems to be that there has been a very noticeable reduction in the cases of rheumatic fever, chorea, and rheumatic heart-disease.

POSSIBLE CAUSES OF THE DECLINE

Rheumatism schemes, supervisory centres, and the provision of hospital and convalescent accommodation for rheumatic children, important preventive measures as they are, can hardly have been developed enough before about 1930 appreciably to influence the decline. Their efficiency was not increased by war, and can hardly be related to the sudden acceleration of the decline since war began.

The decrease in poverty caused by abundant employment during war-time, the greatly increased provision of milk for all children and of solid meals for school-children, the long "changes of air" due to evacuation which have tended to decrease urbanisation, these are all possible factors in the suddenly accelerating decline.

The first is probably the most important of the three, judging by the recent work of Morris and Titmuss (1942), Daniel (1942), Perry and Roberts (1937), and that of many earlier authorities. But beyond and above these factors, important as they are, the facts suggest that the main cause of the decline is of a more subtle kind, and is a change in the relationship between man and the *Streptococcus pyogenes*. Is man becoming more immune, or, in other words, is the *Strep. pyogenes* becoming less likely to provoke the rheumatic reaction, just as it seems becoming less toxigenic as measured by scarlet fever.

Galabin (1902) and Longstaff (1904–05) long ago in this country and Atwater (1927) more recently in America showed a close correspondence between the trend and oscillations of mortality in rheumatic and scarlet fevers. Fig. 1 shows how striking is the similarity of the curves from 1913 to 1942. Since 1876 the mortality from scarlet fever has fallen more nearly to extinction and even more rapidly than that from rheumatic fever. Atwater said:

> "Acute rheumatic fever appears to be related to the family of streptococcal infections, because of bacteriological indications, clinical resemblances, and epidemiological kinships."

There is little evidence of much decline in the incidence of scarlet fever, though its severity has decreased so remarkably that the case-mortality is less (and probably much less) than a fiftieth of what it was in 1876. High carrier rates are known to be common and though there are no early records with which to compare them, it is unlikely that infection with *Strept. pyogenes* is less common than it was. It seems to follow that man is more immune and less likely to exhibit the rheumatic reaction to this infection than he was. It may, however, be that the streptococcus is less virulent.

WHAT OF THE FUTURE?

The close epidemiological relationship of rheumatic fever with scarlet fever imposes caution on prophecy. There are well known to have been several alternations in the history of scarlet fever between periods of extreme mildness and periods (such as the last quarters of both the eighteenth and the nineteenth centuries) of great virulence. Another period of virulence is therefore possible. If it occurs, a corresponding increase in the severity and frequency of rheumatic fever might accompany it. On the other hand, no such long-continued [illegible] has ever been recorded, and though some areas seem to have had some increase of acute rheumatism in 1943 unless there be a great lowering of the standard of life it is unlikely that, apart from minor oscillations, rheumatic fever, juvenile rheumatism, rheumatic heart-disease and chorea will recover their evil prominence as diseases afflicting particularly the school-age.

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NEW REGULATIONS FOR THE FRCS

THE council of the Royal College of Surgeons o England has revised the regulations for the fellowshi and the primary examination beginning on Nov. 29 wi be the last conducted under the present regulations.

The new regulations embody the following changes :–

(i) The primary examination cannot be taken by unde graduates, but will be open only to members of th college, or to graduates in medicine and surgery of th universities and medical colleges recognised by th council for the purpose, who are able to comply wit the conditions of the regulations.

(ii) The subjects of the primary examination will be (*a*) anatomy (including normal histology), and (*b*) a plied physiology and the principles of pathology. synopsis indicating the general scope and spirit the examination in applied physiology and the pri ciples of pathology is published in the new regulations

No candidate will be admissible to the final examination without producing evidence of having been engage in the acquirement of professional knowledge for not les than two years after obtaining the membership of th college or some other recognised qualification, as define above.

The dates of the examinations have been rearranged so that it will be possible for candidates who pass th primary examination to proceed immediately to th final examination, if they are eligible. They can ente for both at the same time.

During 1944 examinations under the new regulation will begin on the following dates :—

Primary—April 24 and Oct. 23.
Final—May 4 and Nov. 2.

Copies of the new regulations, and full particulars, ma be had, post free, from the Director of Examinations Examination Hall, Queen Square, London, W.C.1.

THE Anglo-Soviet Medical Council announce that at 5.30 P on July 15 at the Royal Society of Medicine, 1, Wimpole Street London, W. 1, Prof. Semon Sarkisov will speak on Sovie medical workers in the present war. Professor Sarkisov i vice-president of the USSR Scientific Medical Council an director of the Institute of the Brain, Moscow. He is representative in Great Britain of the Soviet Red Cross and Re Crescent.

SIMPLE MALARIA STAIN.—Dr. F. S. Hansman (sen. hon. biochem. dept. Royal Prince Alfred Hospital, Sydney) recommends the following simple technique for the staining of [illegible] drops of blood for malaria parasites:

1. Fix a thick drop of blood by drying in air and then passing the slide through the flame as for fixing bacteria. Heat the slide till it is just comfortable when placed flat against the ball of the thumb
2. Prepare a solution containing one part of Leishman's stain in about fifteen parts of tap water or buffered distilled water.
3. Pipette 1 c.cm. of this solution on to the thick drop agitate occasionally, taking care to leave the drop covered. Continue till the whole of the hæmoglobin has left the drop, 30–90 sec depending on thickness and age of drop.
4. Add to the diluted stain on the slide several drops of Leishman' stain and mix with a rod or pipette or by blowing, till the flu covers the drop.
5. Leave for two minutes or longer.
6. Wash with tap water and air dry.

It has been found to give consistent results in sever laboratories, including that of the 113th Australian Gener Hospital.

In England Now

A Running Commentary by Peripatetic Correspondents

THE politicians have been talking an amount of nonsense, unusual even for them, about the re-education of Germany after the w [illegible] the whole matter, of which [illegible] t, is the cyclical quality of [illegible] resurgences. If politicians looked after mental patients they would prepare speeches exhorting manics to calm down and deliver them during the depressed stage; and then, overcome by the awful hopelessness of their condition, they would make plans to cheer them up, which of course would operate in the manic stage. Nor are the Germans alone in having cyclical emotions. How long ago is it that the Conservatives were all bent on appeasement, that Labour was anti-military (Cadet Corps? certainly not), and the Oxford Union was disapproving of the service of King and Country? Though they are in no mood to listen now, the fact remains that if you increase a nation's depression in 1945, you increase its manic reaction in 1970.

As I see it man is a cyclical animal with a circumference of 15–30 years. If you ask anybody of adult age what the most vivid period of their memory is, they will tell you a time about 25 years ago (or 50, if they have gone two full circles). I, for instance, am 52 and some years ago I went through a time when I remembered the outbreak of the last war with such vividness that even my nasal and tactile senses were involved, and that sixth sense which can only be described as "how one felt at the time"—in this case thrilled, eager and insecure. Now my memory is most vivid for the postwar period. The boyhood memories of the seventies are just one instance of this constant patch of light on memory's moving film. It is the emotional field that is particularly involved in these cycles, and one could give lots of examples from the religious, artistic and literary as well as the national political world. Often, however, for the emotion that crops up cyclically we have no single word. Canon F came from a home thick with restrictive old-school-tieism, reacted and went through 20 years of expansive brotherhood-of-man in a slum parish. I came to know him towards the end of this time and was surprised to see him go through an attack of o-s-tieism, which I didn't then understand. He recovered and went back to a modulated b-o-m. That was 20 years ago. A month ago somebody sent me a cutting from a paper—a whole column of pure o-s-tieism by Canon F. Of course, these cycles can be hastened or retarded by events in individuals and in nations. Hitlerism undoubtedly hastened Germany's manic stage, in the same way as this hastened the military phase of our appeasers. I prophesy that, given 1912–46 as the peak years of collectivism, individualism should be rampant about 1957. I think the cycle is an old parental and grandparental mechanism in man, but before the politicians educate the Germans we ought to educate them; and before we do that we ought to know more.

* * *

My five-year-old sister Joanna has been immunised against diphtheria. "He stuck a needle into my bottom," she said, "because I had spots there." "Did it cure the spots?" "Oh yes," she said. "Did it hurt?" "Yes," said Joanna. "*With a needle* he stuck me." "But it was a good thing about the spots." "The spots were no matter," Joanna said. "Only Mummy knew about them." I just thought you might like to know what people of that age think you're doing.

* * *

I have been reading *A New Treatise of the Diseases of the Eyes*, by M. de St. Yves, surgeon oculist of the Company of Paris, published in Paris in 1721. St. Yves seems to have been a good observer, but his treatment lags sadly behind observation. Here is a quotation from the English translation of 1741:

"HOW TO BE EXEMPTED FROM THE USE OF SPECTACLES.—I think it necessary to say something of the Means to preserve the Sight, and to lay aside the Use of Spectacles; tho', perhaps, this Method may not succeed to all Persons, yet several, by following it, will be freed from the Trouble of Spectacles. I shall exclude the Myopes, for no remedy can lengthen their Sight; the Good Sight, and that of the Presbytae, can only receive Benefit from this Method. . . .

The Presbytae may be freed from the Use of Spectacles, by restoring their Cristalline to its natural State; the following Tincture will be very serviceable in this Case: It is composed of Sage, Rosemary, Lavender and Thyme, when they are in Flower, of Wormwood and Origany, of each an equal Quantity; let them infuse in Brandy, the space of four Days; then let the Brandy be cleared off, and used in the following Manner: Let one Part of [illegible] distilled Water [illegible] Eye-Bright Wate[illegible] heat, to warm th[illegible] with this Mixture, twinkling the Eye-Lids; that they may imbibe the Water, and convey it round the Eye. . . .

When the Eye is accustomed, for some Time, to this Degree, then let Brandy and the said Waters, of each one Half, be mixed. These Degrees are increased for this Reason, that the Brandy, by its Pungency, may stimulate and vellicate the Eye, by which the Nutritious Juices of the Eye will be more [illegible] ity, as well as [illegible] Help of one and [illegible] natural State."

Vellicate is a lovely word, too good to lose. It is in the OED, so there is no excuse for not using it. The next time I order zinc drops I must tell the chemist to label them *The Vellicating Eye-Drops.*

* * *

Thanks to a direct tip from the BBC, telling healthy adults to keep off, the public round here at last awoke with a bang to the merits of blackcurrant purée and swiped the lot. In spite of announcements to the contrary, I gather that there will be more before winter comes, so here is my cold cure, mainly intended for the bronchitic sort in adults. Take one tablespoon blackcurrant purée and one of whisky, add 500 mg. of ascorbic acid, half a pint of hot water and a little sugar if you like things sweet. Drink it at bedtime. If it doesn't cure your cold it will at least make it worth having.

* * *

The shake-up of jobs produced by the war has thrown me into contact with statisticians, economists, and regular civil servants. They are rational, highly educated people; and when, as a last resort, they ask my advice about their ailments, I am continually amazed at the number who have tried the osteopath before falling back on the doctor. They expound the theory of osteopathy with an almost professional slickness, but of orthodox pathology or even physiology they are completely ignorant. If some physiological Hogben would produce *Applied Physiology for the Million*, he would be rendering a noble service to health education.

A statistician friend was slating orthodox medicine to me on the trolley bus the other morning, and I, as usual, was putting in a word for the use of controls in biological work. By way of example, he gave me the story of a bone-setter who had cured a case of early hydrocele, "simply by adjusting the man's posture." I pricked up my ears. For years I'd wondered about the cause of idiopathic primary hydrocele, but never got any further than the wondering stage. That evening I turned up my surgical pathology books. "The cause of the common idiopathic hydrocele is unknown," I read. When the physician finds fluid, he thinks about back pressure; and he does not dismiss back pressure just because the membranes yielding the transudate become thickened in chronic cases. Suppose flabby abdominal muscles sag down and nip the pampiniform plexus, thus obstructing the venous return from the testicle? The natural result would be an effusion, and in due course a thickened tunica vaginalis. This seems to me a hypothesis well worth exploring. The treatment of early idiopathic hydrocele by abdominal exercise and postural training is a nice little subject for the scientific surgeon. If it comes off, I think the bone-setter ought to get some of the credit.

* * *

The patient complained that she was growing too fat despite her regular habits and mode of living. "Do you think, Doctor," she asked, "that I would be thinner if I led an irregular life?"

Parliament

ON THE FLOOR OF THE HOUSE

MEDICUS MP

The discussion of the Finance Bill is inevitably so technical that the attendance of members is not usually large, nor was it large this week. The attendance at the debate on Civil Defence was larger, but as the discussion, although critical, was friendly, there was no tension in the air. The debate on the committee stage of the Pensions Appeal Tribunal bill was quite another story. On the second reading debate the previous week members had been friendly and encouraging, but when they came to consider the clauses in detail it appeared that large numbers of changes would be needed. When the Minister of Pensions faced the committee there were ten foolscap pages of amendments on the paper, over 80 in number, and they were sponsored by groups—Conservative, Liberal, Labour and Independent Labour—from all over the House. All the amendments were constructive in intention, none was put down for the purpose of making difficulties—but difficulties came very quickly.

A young Conservative who led off wanted a large slice of clause 1 removed so as to give an appellant a right to appeal to the tribunal not limited to attributability or aggravation. The mover was followed by old-guard Conservatives, by Labour and ILP, by Liberals and by many of these varieties in many reduplications. The Minister battled through an explanation, and although everyone was very friendly no-one wanted to give way. The Attorney-General by the Minister's side gave some clear legal opinions which the committee accepted. But more and more discussion centred round the point that as the Minister had agreed to a full discussion of the Royal Warrant about the middle of July was it not difficult—if not futile—to set up an appeal tribunal before any changes to be made were known. Detailed amendments would be required to cover the complicated duties of the tribunals, for they would be dealing not only with the Fighting Forces but with the Mercantile Marine, the Civil Defence services, and the general body of the civilian population. A procedure suited to appeals in cases originating in war-time or at demobilisation might not suit cases arising it might be years after the conclusion of hostilities as the result of illness. Such cases were numerous after the first world-war. And as the discussion went on it became clear that the Minister would be defeated unless he was prepared to accept the unrestricted right of appeal. There were hurried consultations on the front bench, and the Leader of the House appeared. In deference to the opinion of the House Mr. Eden proposed that the bill should be taken back for reconsideration. This means that differences will be hammered out behind the scenes, and he moved the resolution to "report progress and ask leave to sit again." Before this was carried, however, guarantees were asked for that there would be no delay in setting up the tribunals and that preparatory work would continue. These being given, it may still be assumed that the tribunals will start work in September, if not in August.

There is no party question about setting up these tribunals; members of all parties are determined that there shall be no restriction on their work. Much now turns on the changes to be debated in the Royal Warrant. Hopes have been raised that limitations and restrictions will be removed and the conditions of the warrant brought into line with actual conditions today and probable conditions tomorrow.

QUESTION TIME

Medical Services of Government Departments

Sir PERCY HURD asked the Secretary to the Treasury if he could now give a complete list of the health services which came under preferential treatment, all run by various departments of the Government, and would come under the Beveridge proposals, showing the medical and nursing personnel and the cost for each department.—Mr. R. ASSHETON replied: The following departments provide medical services for their staffs, the numbers of medical and associated personnel and the estimated cost being as shown.

Department	*Personnel*	*Cost (£)*
Admiralty	99	43,000
Ministry of Supply	765	210,000
Customs and Excise	2	1,265
Inland Revenue	4	750
Ordnance Survey	1	250
Post Office	25	12,275

In addition about £65,000 is expended by the Post Office in respect of similar services to some 2,600 local medical advisers.

The following departments have medical services for the purpose of fulfilling their administrative functions, the numbers of medical and associated personnel and the estimated cost being as under.

Department	*Personnel*	*Cost (£)*
Broadmoor Criminal Lunatic Asylum	25	10,100
Prison Service, England and Wales	141	56,820
Supreme Court of Judicature	2	3,300
Prison Service, Scotland	14	3,300
Board of Control	427	104,000
Ministry of Pensions	1,276	305,885
Board of Education	8	8,140
Scottish Education Dept.	1	1,100
Ministry of War Transport	2	1,700
Ministry of Health	162	138,586
Welsh Board of Health	9	10,370
Dept. of Health for Scotland	39	34,266
Ministry of Labour and National Service	14	14,032
India Office	3	1,750
Colonial Office	2	2,350
Ministry of Fuel and Power	10	9,000

It was not possible to say how these services might be affected by the Beveridge proposals.

Treatment of Seamen Afloat

Sir F. FREMANTLE asked the Parliamentary secretary to the Ministry of War Transport what steps were being taken to provide facilities for continued treatment of seamen suffering from contagious diseases on board ships that did not carry a medical officer and that might not wait long enough in port to secure continuous treatment.—Mr. NOEL-BAKER replied: Every master of a ship is provided with the *Sea Captain's Medical Guide*, which contains instructions for the treatment of seamen who fall sick, or who suffer from contagious diseases; and every ship must carry adequate supplies of the appropriate drugs. If necessary, a seaman who suffers from a contagious disease is detained for treatment ashore; if that is not required, then it is the general practice for his doctor to give the directions for his further treatment.

Health Services in Mauritius

Colonel O. STANLEY assured Major A. M. LYONS and Mr. DAVID ADAMS that the governor of Mauritius is considering the recommendations contained in Major Orde Browne's report and will lose no time in submitting plans. An anti malarial unit is operating at present, and an engineer is shortly being sent to the island to prepare long-range plans for reducing the incidence of malaria. A nutrition unit is also working in the island.

The Medical Register

Sir E. GRAHAM-LITTLE asked the Lord President of the Council what was the cost to the Exchequer of the production of the Medical Register and the average annual sale of the volume; and whether he would take steps to improve the preparation of the register, for the printing and of which the General Medical Council was responsible, as record of addresses and medical qualifications of doctors was less accurate than the Medical Directory, which was produced by private enterprise.—Sir JOHN ANDERSON replied: The production of the register involves no charge on public funds, its cost being defrayed from the resources of the GM The average annual sale in the three years immediat before the war was 785 copies and in the years 1940- 475 copies. The register, he explained, was not prim intended to serve the purposes of a directory, but stated in the preamble to the Medical Act 1858) to persons requiring medical aid to distinguish qualified unqualified practitioners. I am advised, he added, owing to reduced staff and to the difficulty under war ditions of ascertaining the correctness of many of the regis tered addresses the GMC have found it impracticable t maintain their normal procedure of periodically verify addresses by written inquiry. This procedure would b resumed as soon as normal conditions were restored. Sec 30 of the Medical Act 1858 enabled but did not oblige pract tioners to have inserted in the register certain additional to those by virtue of which they were first registere

Legislation would be required to make the register a complete record of such qualifications

Supply of Army Nurses

State registered nurses for the Army are recruited through the Ministry of Labour from nurses who volunteer for service with the Army and the necessary measures are being taken to meet requirements (Mr A Henderson in reply to Mr F N Hewlett)

Tuberculous Infection among Nurses

Mr F Messer asked the Minister of Health if he could give figures showing the number and percentage of nurses employed in general hospitals who contracted pulmonary tuberculosis, and what relation these figures bore to those employed in tuberculosis sanatoria —Mr E Brown replied I regret that no such figures are available I would point out, however, that in the report of the Medical Research Council Committee on Tuberculosis in War time published in October last it was stated that evidence from other countries and expert opinion in our own suggest that the risk of contracting tuberculosis from nursing tuberculosis patients in sanatoria is no greater than that involve
It may also be noted that in the
supplement of 1931 regarding
observed that mortality statistics provided no evidence of special occupational risk of tuberculosis infection in the nursing profession

Replying further to Mr Messer, Mr Brown said it would not be easy to get the statistics asked for, but he would consider the matter

Diploma in Public Health

Sir F Fremantle asked the Lord President of the Council if steps were being taken to reconsider the courses and examination for the diploma in public health, in accordance with modern requirements, for which the present regulations were insufficient and out of date —Sir John Anderson replied The present resolutions and rules of the General Medical Council for diplomas in public health came into force in October 1938 In 1938–39 a visitation of examinations for such diplomas was made and reported to the GMC in May, 1940 While this criticised the examinations in detail, it did not support the suggestion that the rules were insufficient and out of date In any event war conditions would make any general revision of the curriculum for such diplomas inopportune

Does the Lord President recognise that Assumption B in the Beveridge report rests very largely upon medical officers of health who are one of the linch pins and that the very large number of suggestions that are proposed for the realisation of Assumption B provide that in future the qualification DPH will be considered essential —That point will be kept in view

Sugarless Drinks for Diabetics

Replying to Mr G Griffiths the Parliamentary Secretary to the Ministry of Food said that the desirability of providing some sugarless soft drinks for diabetics had not been overlooked. The Ministry was prepared to permit by licence under regulation 838 (1943) the manufacture of an approved range of such drinks by a limited number of firms qualified to produce them Arrangements were being made in consultation with the Soft Drinks Industry (War Time) Association Ltd

Hot Springs Conference

Mr H Brooke asked the Prime Minister what steps it was proposed to take in this country to implement the recommendation of the Hot Springs Conference that every country should establish a national nutrition organisation composed of authorities in health nutrition economics and agriculture —Mr Eden replied There exists already in this country a standing committee on nutrition composed of representatives of various Government departments and scientific bodies, which performs all the functions recommended in this connexion at Hot Springs

Hips and Haws

It is intended in addition to inviting the collection of rose hips again this year, to arrange for the collection of haws, which have a certain medicinal value (Sir A Duncan in reply to Captain L F Plugge)

Public Health

Pediculus Redivivus

A new Ministry of Health circular (no 2831) returns to the attack on head lice Recognising that infestation is a human rather than a scientific problem the Minister urges that it should be tackled with renewed vigour by his able envoys, the health visitors A head can be cleared of lice with lethane,[1] but it can only be kept clean if its owner (or his mother) is informed and conscientious Health visitors, midwives and all who advise expectant mothers are asked to lose no opportunity of impressing on them the importance of cleanliness In the child's home and at the clinic health visitors

might have been expected", but surely it was a little naive to expect anything of the kind? The most elaborate period of English hairdressing, the eighteenth century, gave rise to the story of the lady with a nest of mice in her hair Has no one pointed out to the ladies of Hollywood their opportunity to contribute to victory by adopting simple and severe hair styles? Health visitors are advised to explain to the adolescent girl that clean well brushed hair looks better than curls main

of the Board of Trade has agreed to increase the supply of strong fine tooth combs, the poster and pamphlet of the Central Council for Health Education are available at the bare cost of production, and the council's new sound film on the louse is soon to be released for hire by local authorities

Infectious Disease in England and Wales

WEEK ENDED JUNE 26

Notifications —The following cases of infectious disease were notified during the week smallpox, 0, scarlet fever, 1680, whooping cough, 2330, diphtheria, 582, paratyphoid, 11, typhoid, 11, measles (excluding rubella), 5774, pneumonia (primary or influenzal), 553, puerperal pyrexia 157, cerebrospinal fever, 64, poliomyelitis, 5, polio encephalitis, 0, encephalitis lethargica, 3, dysentery, 107, ophthalmia neonatorum, 85 No case of cholera, plague or typhus fever was notified during the week

The number of civilian and service sick in the Infectious Hospitals of the London County Council on June 16 was 1633 During the previous week the following cases were admitted scarlet fever 162 diphtheria 25, measles, 83, whooping cough, 36

Deaths —In 126 great towns there were no deaths from enteric fever or scarlet fever, 2 (0) from measles, 13 (3) from whooping cough, 11 (2) from diphtheria, 16 (13) from diarrhœa and enteritis under two years, and 8 (0) from influenza The figures in parentheses are those for London itself

Of the deaths from diarrhœa 4 occurred in Birmingham 3 in Preston

The number of stillbirths notified during the week was 236 (corresponding to a rate of 34 per thousand total births), including 24 in London

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[1] See *Lancet*, 1943 i 406

The Wellcome Research Institution in Euston Road which houses the Museum of Medical Science and the Historical Medical Museum, was damaged by enemy action, but its structure was unharmed and the museums will quickly be put into working order again when labour and materials become available after the war Some of the exhibits in the Historical Museum were injured, but it has been possible to replace or repair most of them Both museums are now under the directorship of Dr S H Daukes The Wellcome Medical Library, containing over 150,000 volumes will also be in the same building

The advertisement for a consulting physician at Clayton Hospital, Wakefield, on page iii of our issue of July 3, was inserted in error, the advertisement on page 25 was correct

Letters to the Editor

FUTURE OF MEDICAL SERVICES

SIR,—I believe the proposals you outline would produce a medical service acceptable to many doctors and at the same time democratic and efficient. The following seem to me to be weak points in the proposals as they stand.

1. *Constitution of the provincial health councils.*—The selection of the members to sit on the provincial councils should be made from the periphery and not by or from the centre. Just as each voluntary hospital possesses a board of management to keep the hospital in touch with public needs and alive to public criticism, so also every health centre (or in cities groups of centres) should possess a community health council, whose functions should be to act as liaison between the public and the medical practitioners in the health centres, as well as between the health committees of the city and boards of hospitals, convalescent homes, &c. From the personnel of these community councils, the public representatives on the regional health councils should be selected. Membership of the community health councils could be decided either by community election, or better by selection from and by those organisations working in the community who take an active interest in health matters—e.g., industry, labour (hospital contributory societies), religious bodies, schools, friendly societies, &c., youth councils, welfare societies, cooperative guilds). A good deal of latitude ought to be left to the community concerned to select its representatives in its own way.

2. I question whether *inspectors* are necessary. To call them investigators does not alter my objection. If this kind of work needs to be done, it should be done either by members of the regular administrative staff or by selected medical practitioners.

3. *Health centres.*—It is hopeless to attempt to plan a single type of health centre. Three or four main types will be required. Each community should choose the type that seems most suited to its needs and be given freedom to develop its own service in its own way (subject of course to overriding control from the regional council and Ministry of Health). The four main types must be for (*a*) a city, (*b*) a large town, (*c*) a small-town plus rural area, and (*d*) rural areas. In my view (*d*) will differ comparatively little in plan from the service at present operating in rural areas, while (*a*) will be more nearly like that outlined in your article.

4. *Free choice and freedom to change.*—Patients should ainly be free to change not only from one doctor to another hin the centre, but also from one health centre to another—ject to the usual safeguards.

5. You do not stress the point that much of the work to be ne in the health centres is not being done anywhere at esent. The extension of medicine into the varied fields of giene must be pressed forward from the outset.

6. From the purely medical or professional angle, the success or failure of the whole plan depends on two factors—the ility of doctors to work together harmoniously, and some eguards to encourage every doctor to pull his weight in the oup. Two things would greatly increase the chances of good team work being done. First, no doctor must be or feel tied to any particular team. Real freedom to change must be preserved; many partnerships split on this rock. Secondly, increases in salary should not be automatic. They should be subject to the expressly stated satisfaction of the other members of the team with the work done. If any member of a firm was informed that his increment in salary was to be opposed by the group on the grounds of slackness or indifferent work he would be faced by a choice between getting a move on and moving elsewhere. This power to oppose the salary advance of members of the group could be made subject to safeguards: the fact that it existed would make its use rarely necessary. New members of a team should be chosen—at least in the final selection—by the team itself.

It would be a fatal error not to draw child welfare, school medicine and youth welfare into the work of the health centre. If this is not done, good-bye to family-as-a-unit doctoring. Antenatal, maternity and postnatal work ought to be done in or from the health centre, even if it is done by whole-time specialists.

Worcester. HOWARD E. COLLIER.

SIR,—One sentence at least in your special article of June 26 must not go unchallenged. You say: "It is almost universally agreed that urban general practice can most efficiently be carried out from health centres, where eight or ten doctors work together." Whether by "almost universally" you mean that almost everybody, both doctors and laymen, agrees or only that almost all doctors agree is not clear, but neither you nor anyone can know because neither the medical profession nor the populace has expressed or been asked to express its opinion. It is certain from letters in the journals that a number of doctors do not agree and have taken pains to say so. But even if this opinion had been generally expressed it would still be, scientifically speaking, of small value because direct evidence on which to base it does not exist. The "health centre" in this country exists scarcely at all except in the roughest kind of sketch on paper. The evidence we have on which to form an opinion is our experience of working in the casualty departments of hospitals where general practice of a kind is carried on by a number of medical officers in touch with each other, our experience of practice in our own consulting-rooms or surgeries, and our experience, from within or from without, of the work done in existing clinics. I should have thought that the only conclusion possible to an unbiased mind is that each of these brands of practice has its own familiar and inherent merits and defects, and that of the clinical and personal problems brought daily by patients to their doctors some could be best tackled in a clinic and by a team; others scarcely, if at all, except by the doctor working as a fully responsible unit in his own consulting-room.

Any of us can make guesses at the probable character of health centre practice, but guesses they must remain until a reasonable number of these centres have been built, equipped, staffed and run for several years. Only then shall we know whether it is easy, or even possible, to find for each of them a team of eight or ten doctors able to work harmoniously and efficiently together; whether the daily throng of patients seeking medicines, medical consolation and certificates can be prevented from turning the overworked doctor into a mere sorting officer; whether the conflicting concepts of team work and individual responsibility can somehow be harmonised; whether the patient can have a choice of doctor or have a doctor of his own despite fixed hours, days off and no competition within the team; whether the patient whom only the direst extremity can induce to visit a hospital will go willingly to a clinic if it is called a health centre—these and the many other problems which look so formidable to many of us can be put to the test and solved, if they are soluble, only by a direct experiment conducted on an adequate scale and for a sufficient length of time.

If, Sir, a new method of treating disseminated sclerosis had been proclaimed from some eminent quarter, and its immediate and universal adoption were being pressed on the profession, I am certain that you would demand the most weighty, unequivocal and well-sifted evidence before giving it the support of an unsigned special article. Is it too much to ask that the same scientific standards should be observed when a new method of practising medicine is being pressed on us for general and irreversible adoption?

London, N.W. LINDSEY W. BATTEN.

RESEARCH OVERLOOKED IN PLANNING

SIR,—I have read with benefit and interest the interim report on Medical Planning Research in your issue of Nov. 21. As a full-time professional research-worker I would like to offer a few comments on an aspect of medical planning which appears to have been completely overlooked—namely, medical research itself.

As I see it, the basic state of medical and surgical progress rests on active medical and surgical research. At the present time such new developments as occur in Britain and the Empire come from various sources—universities, medical schools, the Medical Research Council, commercial houses and the Dominion and Colonial medical services. To my mind (probably now warped by the sun or eaten by the flies) medical research seems uncorrelated, badly organised and insufficiently productive. I am quite sure the men are there. The trouble is difficult to track down, but I offer the following observations:—

(*a*) The universities feel that teaching is their main function on earth—and quite rightly so.

(*b*) Medical schools likewise.

(*c*) The Medical Research Council seems to me too individual and not sufficiently national in its outlook.

(*d*) The commercial houses exercise increasing power over certain branches of medical research—such as chemotherapy. Money talks.

(*e*) The high standard of results which have come from Canada, South Africa and Australia, need no comment.

(*f*) A list of research contributions from the Colonial Ser- [illegible]. The results [illegible] apers is large. [illegible] problems should also be made.

The suggestion I want to make is that the time has now come for an Empire Medical Research Service. Selected men with promising academic records should [illegible] to, and learn their job, in whatsoever branch of medical research they may profess an interest. Subsequently these persons could be sent singly or in teams to such places in the Empire as require aid in any particular problem. There is no shortage of medical problems, believe me! In the course of time one would build up a nucleus of technical experts with an intimate knowledge of these problems.

Throughout the Empire myriad details will have to be thrashed out, but I am certain from the years I have spent in teaching students that there are plenty of young- [illegible] o very well in such an [illegible]. From conversations [illegible] and Colonial men, I gather that the interchangeability of appointments which such a service would offer would be very welcome on both sides.

In the present state of affairs, few without private means can afford to devote the greater part of their lives to medical research.

FULL-TIMER.

TREATMENT OF OSTEOCLASTOMA

SIR,—Dr. Brailsford's conclusions are definite and sweeping enough to demand something amounting to proof before they can be accepted. The five cases he cites hardly provide that proof. All his patients were [illegible] mours, [illegible] rvation [illegible] n to be [illegible] e first [illegible] curet- [illegible] cannot cure all giant-cell tumours, [illegible] ne is rather [illegible] ected for a [illegible] Immediate amputation, which is the treatment of choice for very large giar [illegible] it well have cure [illegible] spected that *inco* [illegible] her by surgery o [illegible] change. The second case proves nothing. Dr. Brailsford reports no histology of either the original tumour nor of the "recurrence," while the third case (with again no histology of the original lesion), if it demonstrates anything at all, merely shows how inaccurate "X-ray diagnosis" of these tumours can be. Both this and the fourth case (apparently really another chondrosarcoma) were either wrongly diagnosed or the treatment must be held responsible for converting "typical" osteoclastomata into chondrosarcomata.

[illegible] al meeting of the [illegible] two radiologists of [illegible] esitatingly at the [illegible] osteoclastoma' from X-ray appearances alone. All four patients received X radiation of no mean dosage. One died within three years of treatment with malignant lesions of her lungs and pelvis. The second was submitted to amputation five years after X-ray treatment; the amputated specimen was a spindle cell sarcoma. The third was dead within three years from a finally fulminating spindle-cell sarcoma with similar metastases, and the fourth had an amputation after six years for a rapidly growing tumour whose histology has proved indeterminate. In all four tumours no shadow of doubt had entered the minds originally reporting the films. All were "typical osteoclastomata," all were given X-ray treatment without biopsy, and in all four either the diagnosis was wrong or X radiation converted these tumours into sarcomata.

Our considered opinion in Manchester, based on Prof. Harry Platt's 35 proven cases of giant-cell tumours in long bones, is that the diagnosis of these, and indeed of all bone tumours, can only be made by a combined assessment of the clinical, radiological and histological features of these lesions. Definitive treatment in the absence of any one of these three types of evidence is often haphazard, unscientific and possibly dangerous. Dr. Brailsford has produced no evidence to shake this belief, and two of his cases strongly support it. The diagnosis cannot be "established" by radiology alone. Biopsy, by which I mean an adequate and searching study of representative portions of the tumour, is both "necessary" and "desirable." In addition, we have abundant evidence that curettage and carbolisation can and do eradicate such of these tumours as are suited to this operation with far more certainty than does X-ray therapy.

Manchester. D. LL. GRIFFITHS.

COLOUR-FILMS IN FIRST-AID TRAINING

SIR,—A year ago Dr. Mearns and I described the technique we had evolved for making a colour-film for first-aid instruction (*Lancet*, 1942, i, 560). That film, *A Bomb Fell*, which was of a mock air-raid incident, was purely experimental and we had hoped to follow it with others on more ambitious lines. Unfortunately we have had no [illegible] depots and to small classes substandard film (16 mm.) has definite advantages. One reel of 15 minutes is as much as the audience will absorb at a sitting. Now that 16 mm. Kodachrome films can be duplicated they can be used in the same way as monochrome films.

Glasgow. G. H. HUMBLE.

IDIOSYNCRASY TO PENTOTHAL SODIUM

SIR,—I was much interested in the letter from Dr. Lees in your issue of June 19. [illegible] simple explanation [illegible] does not necessitate [illegible] idiosyncrasy. It seems most likely that the injection was not made into a vein, but into an adjacent artery. The aspiration test would suck blood into the syringe with the needle in this position as well as—if not better than—if it were in a vein. The burning pain down the hand is readily explained by the passage of 'Pentothal' via the capillaries on its way to the general circulation.

Such an injection into an underlying brachial artery was once made by a colleague of mine, who reported that his patient complained of an identical burning pain. The area of hyperæmia is surely explained by a minute subcutaneous leakage of pentothal, possibly forced past the needle by the arterial pressure. The patient's skin sensitivity, as evidenced by the dermatographia, would explain the extent and persistence of the hyperæmia.

Wimpole Street, W.1. F. W. ROBERTS.

SEAMAN'S ABLE BODY

SIR,—Your leading article of June 26, which describes the long and arduous campaign for a healthy Merchant Navy and offers constructive suggestions for winning the battle of medical services, naturally evokes the keenest interest of the Seamen's Hospital Society, which maintains a group of six hospitals for seamen and has contributed towards many of the objects you advocated.

As your article has once again made clear, the hospital needs of seamen differ fundamentally from those of landsmen—for example, the Seamen's Hospitals have been accustomed for more than 120 years to receive for treatment, direct from their ships, sailors who are not in touch with a general practitioner. The *Dreadnought* at Greenwich, with its branch hospitals, supplies all the main forms of necessary treatment, including specialised treatment, aftercare and rehabilitation. It has for many years maintained an ambulance service, available day and night to any part of the Port of London. It retains seamen patients in its care throughout their convalescence until they are fit to return to sea. Since 1938, the rehabilitation of injured seamen has been carried out with striking success at the society's Albert Dock Hospital, where, recognising that in the shipping industry "light work" does not exist, rehabilitation has been carried to the stage where the sailor is again fit for work at sea, stopping short only at providing vocational training in different employment ashore. Since 1921, the society's King George's Sanatorium for Sailors has provided treatment for tuberculous seamen. The society's Hospital for Tropical Diseases has brought particular advantages to seamen who contract such illnesses during their voyages through the tropics.

We hope that the planning of a hospital and health service for the Mercantile Marine will be undertaken by the Ministry of War Transport, and that the Seamen's Hospital Society will be asked to contribute evidence from its long experience. The committee of management and the professional staff have announced their readiness to adapt their organisation to changes which may come about in the shipping industry.

F. A. LYON,

Greenwich. Secretary, Seamen's Hospital Society.

CUTANEOUS DIPHTHERIA ?

SIR,—After reading Cameron and Muir's article (*Lancet*, Dec. 19) I saw an airman with five chronic sores about the arms and hands, two on the right forearm, one on the dorsum of the right wrist, one near the left elbow, and one—the largest—on the medial aspect of the left hypothenar eminence. These sores had developed 5 months before and had been treated with various dressings without improvement. When I saw them they were stationary; the largest was ¾ in. in diameter, the others about ½ in. Clinically they were veldt sores; bacteriological examination of the discharge revealed *Staph. aureus* only; but this was not unexpected when their chronicity was considered.

Diphtheria antitoxin, as recommended by Dr. Manson-Bahr, was given. The antitoxin (Globulins SAIMR brand) was injected subcutaneously into the sore itself, the needle puncture being made ½ in. from the periphery of the sore, 1000 units into four, and 2000 units into the largest. Dry dressings were applied and the patient ordered to report in 20 days time, when the sores were found to be completely healed, with scarring.

Southern Rhodesia. THOMAS JAMES.

PLASTICS IN SURGERY

SIR,—Your leading article of June 28 stimulates me to [illegible] on the use of 'Cellophane' as a protective dressing. For many years I have used this substance as the only dressing for all abdominal operation wounds that are likely to heal by first intention, and have found it satisfactory in every way.

The ordinary thin gauge cellophane sold in rolls at the popular 6*d*. stores is used. It is cut into pieces measuring 6 in. × 8 in.; each piece is rolled in a single thickness of gauze, placed on a tray and covered with a towel and autoclaved in the same way as gloves. 'Benzo Mastiche' is painted in a broad band around the wound, care being taken to prevent the solution touching the wound itself. The cellophane is then applied. Usually I close the skin with a 00 plain catgut glover's stitch, but the dressing is quite satisfactory with interrupted silkworm-gut stitches or clips. No other dressing or bandage is applied.

This method can be used in children or adults. The membrane can also be used as a protective dressing and does not seem to prevent the growth of epithelium in ulcers. I have not used it where there is likely to be a purulent discharge. The dressing is transparent, so the wound can be inspected easily at any time, and it does not shift. It is extremely comfortable, and I have never seen any maceration or irritation as the result of its use.

Redhill County Hospital, Edgware. D. B. CRAIG.

DEFECTS IN HOSPITAL AND SPECIALIST SERVICES

SIR,—Our obligation to the sick and wounded compels prompt attention to the following obvious and remediable defects in current medical organisation, for they represent stumbling blocks in the way of the war effort as well as ordinary civilian practice, and absent colleagues will surely approve of our getting on with measures of reform that will hasten their homecoming.

1. *Lack of coördination.*—The remedy for this is to copy commerce and pool our resources. Adjacent general hospitals, providing independently for the needs of the community, cost more to run and achieve less than if they combine. By pooling beds, none need lie empty in one hospital while those in another nearby cannot cope with the waiting list. Moreover, it is sometimes beneficial to concentrate patients of one category in one hospital. Let hospital authorities put the prospects of the patient first and the origin and historical work of institutions second.

2. *Unhealthy hospital sites.*—Sites and plans for postwar hospitals are even now being determined. The country's medical services seem likely to be administered in regions, each having a complete group of hospitals. The chief institution will combine teaching with treatment. Let such new hospital centres be correlated not only with others in their district but, where practicable, be healthily situated. To give a practical example, the ideal site for the parent hospital in Bristol would be the parkland on the western fringe of the city, about 2½ miles from the centre. The influence of an ideal setting might, in a dubious issue, turn the scales in the patient's favour. The system of the future must provide facilities for medical education, but such secondary functions must not determine the main structure of the system. What will the public say, if the interests of the patients are sacrificed to the convenience of teaching students?

3. *Nursing the clean with the septic.*—In some hospitals there is disregard for simple hygiene. A general ward for clean operations (such as breast, thyroid, gastric, hernia and many genito-urinary conditions) should be free from the grossly septic cellulitis, abscesses, virulent bowel and bone infections. To handle the clean with elaborate asceptic ritual in the theatre but return them to be nursed next cases reeking with pus is inconsistent. The latter should be admitted into "septic" wards, after the practice in the best hospitals.

4. *Appointments and teams.*—Juniors as far as practicable, and senior surgeons as a routine, should have one scene for their labours on the principle of "one surgeon, one hospital." At present a surgeon tends to range over several hospitals treating patients in small numbers in each, and his colleagues are doing the same, with the result that the nurses and theatre staffs are expected to master the different methods of numerous surgeons. Concentrate all his cases at one hospital and let him employ his single theatre team and ward staff fully.

A junior should not only join as, but be, an assistant. He and his chief form the basis of a "team." Then the patient is spared risks due to the inexperience of a junior, because the latter has the benefit of his chief's judgment. A junior shares the beds allotted to his firm, though entitled only to a few of his own.

5. *The term "consultant."*—There is at present nothing to forbid a country doctor putting up a plate in Harley Street and establishing himself as a self-styled specialist among a credulous and monied clientele. The time has come to insist that each doctor fulfils well his own functions and refrains from amateur efforts in other directions. The custom by which consultants accept only patients sent by a doctor should be made compulsory. The layman may be misguided by well-meaning friends into consulting the inappropriate specialist; and even the right specialist might recommend treatment to be given by the family doctor, when an awkward situation arises; for the doctor cannot be responsible for care of a patient at one moment and then find someone else suddenly intervening.

6. *Institutional facilities for general practitioners.*—Doctors are in a dilemma over patients who need more nursing care than their home provides; the ideal solution is a general-practice annexe to our existing hospitals. Benefits of nursing, diet and overhead charges should be shared with the main institution. When cases suddenly needed specialist treatment, consultation could be arranged easily, and the patien

transferred to the hospital proper if necessary. This would unify practitioner and specialist services.

Let us remove such just causes of criticism right away, and so prove that we are qualified to shape the health services of the future.

Clifton, Bristol. A. WILFRID ADAMS.

BACTERIOLOGY OF WAR WOUNDS

SIR,—May I say with what interest and delight I have read Major Pulvertaft's article (July 3, p. 1). It is to be hoped that our prophets, professors and practitioners of surgery will mark well and inwardly digest his words which, to my mind, have the ring of wisdom. I may now safely disclose some words addressed personally to me at the end of the last world-war, in 1918, by the late Sir Gilbert Barling. His opinion was that of the many materials used to combat sepsis in wounds during the years 1914 to 1918 none came out with higher reputation than "normal saline" solution. This remark, based on wide experience and made after long-considered judgment, may be worth recalling now.

Folkestone. AUSTIN PRIESTMAN.

Obituary

JOHN MOORCROFT McCLOY

M D, D P H BELF

Dr. John McCloy, chief medical officer to the Ministry f Home Affairs in Northern Ireland, died at his home in lelfast on May 27. He had had a varied life. Born in 'hiladelphia in 1874 he taught for some time before aking up the study of medicine at Queen's College, from which he graduated in 1900. He then turned to public health and was resident at a fever hospital. During the first world-war he worked in the laboratory of the St. John Ambulance Brigade Hospital at Etaples, with the rank of captain, RAMC. On his return he became medical inspector to the Home Department and later its CMO. At the same time he was chairman of the Joint Nursing and Midwives Council, and external examiner in public health to Queen's University. He is survived by his widow, née Kathleen Kyle; their only daughter has almost completed her medical studies.

Sir Thomas Houston writes: As one who was closely ssociated with Dr. McCloy during his service with the RAMC in France I feel I can best add my personal ribute to his memory by describing the part he played in he last war (1914–18). When war broke out the Order of St. John [illegible] ecided to send a brigade [illegible] the nation. A number of [illegible] by Colonel Trimble (after- [illegible] staff the hospital, one of the irst to volunteer being McCloy. We were entrusted vith the ordering and getting together of the entire aboratory equipment; we had to arrange for sterilisaion with electricity, primus lamps, &c., as there was to be o gas in the hospital. McCloy's knowledge of bacterioogy combined with great business capacity and methoical habit were invaluable in this arduous task, and we btained one of the best equipped laboratories in France. We arrived at Etaples in July, 1915, and found urgent eed for blood transfusions. At this time the technique vas practically unknown in France, but McCloy was amiliar with Landsteiner's work on blood groups and we ersuaded other hospitals to adopt typing before transusion. McCloy had many friendly battles to fight in his crusade, until the Americans came to France and nsisted that it was criminal to transfuse without deternining the suitability of the donor. At the suggestion of the Director of Pathology we undertook a research on the classification of streptococci in which McCloy was indefatigable; some at least of his conclusions have stood the test of time. Our hospital at Etaples was reduced to ruins by two German bombing raids and was removed to Trouville; in this trying ordeal McCloy showed [illegible] lity. After the war the [illegible] y the Order of St. John [illegible] in Belfast, and was ship [illegible] d Pirie. Such a man was McCloy. By his death I have lost a life-long friend and the profession in Northern Ireland one who was universally respected and admired.

ANDERSON GRAY McKENDRICK

M B GLASG, D SO ABERD, F R C P E, F R S E

LIEUT.-COLONEL IMS (RETD)

Colonel McKendrick, who died at Speyside on May 30, had [illegible] Edinburgh. He was younger son of John McKendrick and was born in the year his father became professor of physiology at Glasgow. Gairdner, Lister, Kelvin and John Caird were among the visitors in a home circle in which the physiologist was savant, physician and poet as well as naturalist in the sense of Gairdner's definition "a humble, reverent, and exact follower and [illegible]" From [illegible] fic cult [illegible] service [illegible] in 1900 he entered the IMS and gained distinction in Somaliland operations before transference to the bacteriological department of the Government of India where he was assistant secretary to the DG (San.) and director (1914–20) of the Pasteur Institute at Kasauli. It was then that he developed the mathematical bent by which most of his medical friends will remember him. As civil surgeon at Nadia (Bengal) he had lived with the engineer engaged in building a Ganges bridge, and he arrived at Kasauli with a treasured copy of Perry's *Calculus for Engineers*. From this he proceeded to Mellor's *Higher* [illegible] ingenious study [illegible] (*Lancet*, 1931, i, 698), suggesting that early environmental factors up to the age of 15 are of overriding importance in determining the "expectation of life" of a given age-group in the national life tables. As with his father before him McKendrick's whole life was coloured by an original and constructive outlook on religion. Only the threat of serious ill health led him to retire, during the war, from [illegible] oratories, and his [illegible] Inverness village [illegible] his 67th year.

WILLIAM ELMSLIE HENDERSON

MB ABERD, DPH MANC

Dr. Elmslie Henderson, who died on June 20 at Aberdeen in his 72nd year, was for thirty years MOH of Westmorland. Retiring in 1940 under the age limit, he answered a call from Horncastle and for another three years took the place of the asst. MOH for the Parts of Lindsey, who is a prisoner of war. Henderson qualified at Aberdeen in 1898 and was house-surgeon at the Royal Infirmary before visiting Dublin and Manchester and turning to public health as a career. To his first appointment as school medical officer at Kendal he brought a scholarly mind and an interest in children, whether sick or well, that appealed to the teachers. He faced resolutely and with quiet humour the health problems which arose in the last war, paying special attention to child welfare, home nursing and the care of cripples. He was a natural leader of the scout movement and a willing coadjutor of the St. John Ambulance Brigade; a colleague writes of his overflowing joy when a team from Kendal won the Dewar shield. Most of his week ends were spent in lecturing in some part of the widely scattered county, generally on some aspect of hygiene but now and then on Border troubles or other theme of historical interest. He never lost his temper, even under provocation, and his memory in the county is of a quiet kindly spirit, intolerant only of make-believe.

JOHN HARPER GRAVES

MRCS; SURG.-LIEUT. RNVR

Lieutenant Graves, whose death by enemy action was reported in June, was educated at Radley, where he rowed in the eight, and at St. Thomas's from which he qualified in 1939, a few weeks before war broke out. From holding a resident post there he went on to St. Anthony's, Cheam, and a house-surgeoncy at the County Hospital, Brighton, before receiving a temporary commission in the Navy. He served in a destroyer, and in combined operations in the Indian Ocean, contracted malaria and was invalided home last December. On recovery he held a post in the dockyard at Devonport.

A colleague writes: Jock Graves, by his early death, is lost to a profession that always gave high place to men of his qualities. We shall honour him for his unassuming and cheerful modesty; for his intellectual honesty and for his kindness to his humblest patients. His charm lay in the fact that in his life he was a giver, rather than a taker; a warm friendliness endeared him alike to teachers, colleagues, patients and children. Like many men whose characters mature slowly, he was showing the depth and steadfastness that would have made him a fine doctor. The memory of this fresh and lovable personality will lighten our burden as we try to build afresh the world in which he would have played such a worth while rôle.

N. A. DYCE SHARP

MRCP

Neville Alexander Dyce Sharp, who was reported missing as the result of enemy action at sea in October, 1942, was born in 1884 the son of William Sharp, solicitor, of Reigate, Surrey. Educated at the South Eastern College, Ramsgate, after travelling a while in Canada, he entered Guy's Hospital, obtaining the conjoint diploma in 1911 and the certificate of the London School of Tropical Medicine in 1912. At the end of that year he joined the West African Medical Service, and was posted to the Gold Coast, arriving in time to witness a serious outbreak of yellow fever in Accra. When war started he was granted a temporary commission in the Army, and served under Major-General Sir Charles Dobell in the Cameroons Expeditionary Force, where he received general commendation for his resource and enterprise. While on leave in England in 1916 he was struck down by a severe attack of typhoid fever, but he was able to return to West Africa after a few months, and was attached to the northern column of the Expeditionary Force in N. Nigeria till he was invalided home in November, 1918. Next for two years he acted as physician to the British Legation in Addis Ababa. There he made himself familiar with the ways of the Abyssinians, being especially interested in the slavery problem, and learned to speak Amhara. Many people will remember his broadcast in the stormy days of 1936 on his experiences in that country. His good horsemanship deeply impressed the inhabitants. In 1922, after rejoining the West African Medical Service, he worked on trypanosomiasis, eventually being transferred to the Gold Coast, and becoming SMO. He retired at the age of 55 in 1939, and latterly had been medical officer to the Konongo Gold Mines. He met his end returning from the Gold Coast on sick leave. He was last seen attending to the injured when his ship went down.

Dyce Sharp contributed his bit to the progress of tropical medicine. His best work was on filariasis—he was the first to discover the life-history of *Filaria (Dipetalonema) perstans* in a midge *Culicoides austeni*, on the Gold Coast in 1928. His paper in the *Transactions of the Royal Society of Tropical Medicine* (1928, 21, 371) describes the almost insuperable difficulties of studying this microscopic insect and the strain on his eyes in identifying and dissecting it under primitive conditions. He eventually succeeded in keeping the midges alive for ten days in a silk pyjama leg stretched over a wire frame. He was assisted by two native boys—Kofi, a natural fly expert, who never forgot or forgave an insect that bit him, and Peter, who combined the job of garden-boy and fly-bait. Sharp also did some excellent research on microfilariæ found in the skin of natives, especially on the beetle known as *Agamofilaria streptocerca* and on the morphological distinctions between the embryos of *Wuchereria bancrofti*, *Loa loa* and *Onchocerca volvulus*. He wrote the tropical section in the 13th edition of Taylor's *Practice of Medicine*, and published a paper on the shock treatment of leprosy by intravenous injection of condensed milk. Being of an observant nature he studied the gorilla in its native haunts in S. Nigeria and the Cameroons. He described its primitive habitation, and like Du Chaillu before him divined in its incoherent grunts a form of primitive language. He would also discuss the habits of that mysterious creature the Nandi bear, in whose existence the negroes firmly believe and whose foot-prints he claimed to have seen.

He married in 1921 Flora elder daughter of R. Macdonald of Skye, and had two daughters.

Appointments

MAGAURAN, W. H. B., FRCS, temp. hon. surgeon to ear, nose and throat dept., St. John's Hospital, London, S.E.

MARTIN, A. JOYCE, MRCS, temp. hon. physician in psychological medicine, St. John's Hospital, S.E.

Colonial Medical Service.—The following appointments are announced:—

DICKIE, R., MB, medical officer, Nigeria.
THOMAS, L. H., MRCS, senior health officer, Gold Coast.
WALTON, G. A., MB, medical entomologist, Sierra Leone.

Births, Marriages and Deaths

BIRTHS

DON.—On July 3, at Adlington, Cheshire, the wife of Major C. S. D. Don, RAMC—a daughter.

EVANS.—On June 29, at Southborough, Kent, the wife of Captain G. Rhys Evans, RAMC—a son.

CAMPBELL.—On June 27, at Dundee, the wife of Surgeon Lieut.-Commander W. G. Campbell, RNVR—a daughter.

CLARKE.—On June 30, at the Luton and Dunstable Hospital, the wife of Dr. J. G. R. Clarke—a son.

CRESSWELL.—On July 3, at Dowlais, the wife of Major P. E. Cresswell, RAMC—a daughter.

EASTCOTT.—On June 28, at St. Mary's Hospital, W2, the wife of Dr. H. H. G. Eastcott, of Hayes, Msx—a daughter.

GORDON.—On May 19, at Farnborough, Kent, the wife of Flight-Lieutenant John Gordon, RAF—a daughter.

HARGREAVES.—On June 26, at the Royal Northern Hospital, the wife of Lieut.-Colonel G. R. Hargreaves, RAMC—a daughter.

HUNT.—On July 3, at Cambridge, the wife of Squadron-Leader John Hunt, RAF—a daughter.

KERR.—On June 8, at Cairo, the wife of Captain J. G. Kerr, RAMC, of Southport—a son.

LUNN.—On June 29, at Woking, the wife of Major H. F. Lunn, RAMC—a daughter.

PLEWES.—On June 22, at Luton, the wife of Mr. L. W. Plewes, FRCSE—a son.

PRICE.—On July 1, at Emsworth, the wife of Surgeon Lieut.-Commander S. H. R. Price, RN—a daughter.

PRITCHARD.—On June 26, at Hemel Hempstead, the wife of Dr. J. J. Pritchard—a son.

WALLIS.—On July 3, at Sutton, the wife of Dr. H. R. E. Wallis, RAF—a daughter.

MARRIAGES

GILMOUR—KAY.—On June 29, at Greenock, Paymaster Commander James Kerr Gilmour, RNVR, of Bothwell, Lanarkshire, to Ethel Jean Kay, MB, of Driffield.

JEFFERSON—WADE.—On March 17, at Warrington, Lieut. John Michael Jefferson, RAMC, elder son of Prof. Geoffrey Jefferson, to Margaret Wade, MB.

LISTER—TRAFFORD.—On July 3, in London, John Lister, MB, to Eileen Doris Trafford, MB.

PONDER—TIDMAN.—On July 3, at Sheerness, Surgeon Lieutenant Richard Ponder, RN, to Beryl Ryall Tidman, QARNNS(R).

SMITH—DUFF.—On June 26, at Beckenham, Flying-Officer John Warner Smith, BM, RAF, of Ware, to Olive May Duff, WRNS.

DEATHS

COATES.—On July 2, Frederick Arthur Coates, MB BRIST., MRCS, of Whitchurch, Hants, aged 68.

GRAY.—On July 1, at Haytor Vale, Devon, Robert Walker Gray, MB EDIN, DPH, aged 78.

HENDERSON.—On June 26, at Aberdeen, William Elmslie Henderson, MB ABERD., DPH.

HIGHET.—On June 30, Campbell Highet, MB GLASG., of Reading, and late of Ayr.

JACOB.—On June 19, at North Stoke, Oxon, Surgeon Lieut.-Commander Norman Bremer Vickers Jacob, RN (retd), formerly of Blackheath.

PENBERTHY.—On July [illegible] Devon, William Penberthy, MRCS, late of [illegible] 76.

RAMSDEN.—On July 2, [illegible] Lancs, Ernest Arthur Ramsden, MRCS, DPH.

THOMSON.—On June 29, at Wimborne, Charles Bertram Thomson, FRCS.

VARIAN.—On July 1, Hilda Maud Varian, MD DUBL, wife of Dr. George Varian, of Totnes, Devon.

Notes and News

A HOSPITAL IN THE HILLS

THE Lebanon Hospital for Mental Diseases is a year older than the century, and standing as it does among the foothills of Mount Lebanon, about five miles from Beirût, in Syria, it serves a people who in the past have lacked care in mental illness, perhaps more bitterly than any others in the world. At the annual meeting in London on July 1, Sir Wyndham Deedes, who took the chair, told how in the late years of the last century it was customary for Turkish officials to visit the local institution for the insane, in order to stare at the chan [illegible]

[illegible] from small beginnings the hospital had grown until it would accommodate 500 psychotic patients, and an ample staff had been provided for their care. The war has inevitably interrupted the work to some extent. Half the beds have been lent to the military authorities for the care of Service patients, and there have been difficulties about finding nursing and housekeeping staff for the remaining 250 patients. The matron, who has held her post since 1913, has now no other English nurse to assist her, but local help is forthcoming and the medical director, Dr. R. Stewart Miller, still has his medical staff.

Mr. Lyn Harris, chairman of the general committee, spoke of the second aim of the hospital—to provide treatment for cases of neurosis, and of mental disorders which might precede insanity. This is still to be achieved, when war gives place to service; and it will be done against a new background, as Mr. F. Hourani, who spoke of the hopes of a free Lebanon, pointed out. The many friends of the hospital who attended the meeting may well feel that the work is needed and will continue to find warm supporters. The London office is at Drayton House, Gordon Street, W.C.1.

LEPROSY IN THE EMPIRE

"IT is estimated that there are still over 2 million lepers in the Empire," said Sir William Peel to the British Empire Leprosy Relief Association (BELRA) meeting in London on June 24. With money now available under the Colonial Development and Welfare Act, Colonies could no longer plead that funds do not allow them to meet their responsibility for adequate measures of prevention and treatment. BELRA wanted to give all possible assistance and it was hoped that the work formerly done by its medical secretary, Dr. E. Muir, in visiting the Colonies could be intensified after the war by appointing one or more assistants. It was also suggested that a second research station, besides the one at Calcutta, should be established, with facilities for training anti-leprosy workers, both medical and lay.

Sir Cuthbert Sprawson, MD, pointed out that 71 years after the discovery of the leprosy bacillus there is probably more leprosy in the world than when it was discovered. But fortunately there was another side to the picture. The care of lepers had greatly improved in the past 20–30 years and the atmosphere in leper hospitals had changed to one of hope. The benefit given by the hydnocarpus oils, introduced by Sir Leonard Rogers in 1916, sufficed to draw the patient to the hospital or clinic. Further it allowed the doctor to instruct the patient and the public. "We have learnt," said Sir Cuthbert, "and this applies to other diseases besides leprosy, that it is no good attempting to conduct propaganda and preventive treatment among a primitive population unless you combine it with curative treatment. Increased understanding of n [illegible] t predis [illegible] ient and [illegible] prevention had also increased; but the methods, which often involved segregation, must be adapted to local custom and prejudices. Field research on epidemiological lines had shown that many mild cases of leprosy, even in children, recover spontaneously, sometimes without the sufferer knowing he has had the disease. "We have learned, too, how important it is to keep the patients physically exercised and usefully occupied in some productive work," so that they feel themselves still of value to the world; and in conclusion Sir Cuthbert spoke of the need for special institutions for those who have passed through the contagious stage of the disease but have been left crippled or are too old or feeble to work.

The address of BELRA is 26, Kidderpore avenue, London, N.W.3.

A FILM ON NEUROPSYCHIATRY

BESIDES the film on scabies,[1] the Ministry of Information has produced for the Ministry of Health a longer film illustrating the work and organisation of one of the special centres set up under the EMS for the treatment of neurotic pat[illegible]nt [illegible] scabies scenario, but it is an impressive document all the same. We are taken through the various stages the patient encounters from the day he is admitted until he is fit to return either to his service or to industry—usually six to eight weeks later. The welcoming admission, the sympathy and interest [illegible] are all well illustrated (though it was not clear why the frustrated housewife who yearns for artistic expression should [illegible] pastry modelling [illegible] later scenes do not [illegible], this may be due partly to the hypnotic effect of slabs of white text on a black ground drifting upwards gently out of sight—a device so powerfully sleep producing that it might well be introduced into psychiatric methods. The discussion between the psychiatrist and the distinguished soldier about disposal might have been enlivened by a view of the patients discussed. But much information about the modern treatment of neurotic cases is well set out, and the scope and diversity of methods may come as a surprise even to members of the medical profession. Apart from the announcer—had he been borrowed from the BBC?—hardly an English voice was to be heard throughout the film. Scotland, Ireland and Wales, however, were well represented.

CARLILE AND THE SURGEONS[2]

Richard Carlile died a hundred years ago, but is still remembered for his struggle to secure the freedom of the press. He spent a good many years of his life in prison, because he consistently refused to pay any of the numerous fines inflicted on him for his efforts to secure liberty of opinion at a period when the politicians of the day were seriously disturbed by the spread of republican and atheistical doctrines. In the course of his lifelong efforts to secure free expression of his opinions he became associated in a curious fashion with the distinguished surgeon who was later known as Sir William Lawrence. Dr. Brook has recalled this episode and what it led to as his contribution to the memory of Richard Carlile. Lawrence had at one time, as professor of anatomy at the Royal College of Surgeons, published a lecture which was considered by some of the seniors of the profession to be of an atheistical tendency; and though it is difficult now to see why there should have been an outcry, he was deprived of his position and eventually withdrew the offending lecture. A few years later Carlile saw fit to republish the lecture in spite of Lawrence's efforts to prevent it. There is evidence that at one time Lawrence and Carlile were closely associated in literary publications, and when in 1824 Wakley founded THE LANCET and attacked the College of Surgeons Lawrence was his ardent assistant, and Carlile also took a large share in the conflict. In after years Lawrence took an opposite view of these activities, and even entered into violent proceedings against Wakley and the reforming party. In exploring the available records of this quarrel, in which much is still obscure, Dr. Brook throws some sidelight on Wakley, Joseph Hume, Robert Taylor, and Abernethy; but Carlile remains his principal figure and his connexion with the medical reformers of the time is interesting.

The price of the *Year Book of Diseases of the Ear, Nose and Throat*, reviewed in our issue of July 3 (p. 16) should have been given as 19s. Messrs. H. K. Lewis tell us that all the 1942 Year Books except that on *Physical Therapy* are out of print.

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[1] See *Lancet* 1943, i, 437.

[2] By Charles Wortham Brook. (Strickland Press. Pp. 78. 2s.)

University of Oxford

On July 1 the degrees of BM, B CH were conferred on J. A. Ritchie and (in absentia) R. E. Lee.

University of Manchester

At recent examinations the following candidates were successful:—

MD (by thesis).—T. E. Barlow, B. Finkleman, I. Harvey Flack and W. H. Shepley (all with commendation).

MD (by examination.—George Bridge.

MB & ChB (*with second-class honours*).—R. I. Mackay,† S. B. Rampling,* A. F. Robinson and Raphael Tepper.†

MB and Ch. B.—J. S. Battersby, D. O. A. Bevis, D. H. Blakey, H. M. Blaquière,* D. L. Boardman, H. L. Brisk, C. P. Brown, O. O. Cowpe, Frances G. Danson, C. J. Dewhurst, P. R. Duncan, B. I. Einhorn, Nora F. M. Falk (Mrs. Wilkinson), Frank Fletcher, J. W. Fletcher, Margaret Garnett,* John Grayson, George Hargreaves, J. C. Howarth, Mary W. P. Huddart, Frank Jackson, Marjorie T. Lee, Mary P. McGlade, E. B. N. Merchant, Doreen Mitchell, J. G. Oddy, Sholem Portnoy, Ruth J. Prausnitz (née Whitley), P. T. Quinlan, P. H. Renton, R. H. Sewell, J. H. Shelswell, K. H. Smith, Harry Sosnowick, J. L. Taylor, Lois E. N. Turner, Paul Vulfsons, E. G. Wade,* Margaret Wardle and T. A. Yates.

* Distinction in medicine. † Distinction in surgery.

University of Birmingham

On July 3 the following degrees and diplomas were conferred:

MD (*ex officio*).—A. C. Frazer (professor of pharmacology) and J. M. Webster (professor of forensic medicine).

MD (*with honours*).—J. L. Collis.

MB, Ch B (*second-class honours*).—E. A. Barker and J. N. Wilson (distinction in medicine), V. S. Brookes (distinction in midwifery), Kathleen M. Lawrence (distinction in medicine and midwifery), and R. W. Tudor (distinction in medicine and surgery).

[illegible] Arundell, Ursula M. Baines, Helen J. Bayliss, [illegible] R. L. Bishton, Peter Brown, Kathleen M. [illegible] Clarke, M. A. Cooke, Frank Cullis, Paul Dawson-Edwards, C. B. Eccles-Smith, Jean Edmonds, C. G. Edwards, H. J. Hambling Evans, K. W. Forber, John Hallam, Abdel Hamid Hamed, J. G. Hoult, Arthur Jarrett, Leslie Joseph, Beatrix Kaelin, A. R. Kenderdine, Eileen M. MacShane, Julia M. Neal, Margaret Newton, K. I. Price, Joan Stanton, L. J. Topham, John Tregillus, L. W. Waters, T. A. White, Yvonne J. Williams (distinction in medicine) and Barbara D. Wright.

University of St. Andrews

On June 25 the following degrees were conferred:—

MD.—G. H. Robertson (with honours), D. M. McGillivray.

MB, ChB.—J. G. Lawson (with distinction), A. L. Webster, J. W. F. Scrimgeour, G. W. Mills, J. D. Stephen, W. L. M. Perry, J. W. Eadie, W. M. Walker, Allan Herschell, Constance F. Drysdale, and Violet Auld (all with commendation).

J. M. Aitken, Sheena M. Allardice, G. M. Ashurst, Ann B. Austin, Ann E. Bruce, J. M. Brunton, Mary E. Bryson, W. E. A. Buchanan, William Christie, Sheila G. F. Conacher, Frances R. T. Broadbent or Cruickshank, William Davidson, D. A. E. Dewar, J. G. Fisher, J. L. Fyfe, A. C. Hay, Frances C. Kerr, J. A. R. Lawson, Margaret P. Laxton, Joan I. McCracken, Ian C. R. Macdonald, R. A. McInroy, B. A. Marshall, Doris C. Morgan, R. M. Munro, Sheila M. Ore, Evelyn J. Rounthwaite, Daphne M. Scott or Rushforth, Stephen N. P. Stobie, Ronald Summers and Ian M. Troup.

The Price memorial prize (surgery) went to Lockhart Frain-Bell and A. G. Watson; the Capt. W. A. Low prize and medal in medicine for most distinguished graduate to J. G. Lawson; the MacEwan prize (surgery) to A. L. Webster; and the Robert Davies Royds prize (medicine and pathology) to J. W. F. Scrimgeour.

University of Dublin

On June 30 the following degrees were conferred:—

MD.—D. T. Bardon, M. C. Brough, A. F. J. Delany, M. H. Fridjhon, C. P. Clancy-Gore and Simon Sevitt.

MB, B Ch, BAO.—M. T. S. Conradie, O. S. Cummins, Lorna R. J. d'Abreu, A. P. Dignan, A. J. H. Donnell, Margaret E. Eccles, D. F. S. Flood, E. F. B. Forster, J. M. Garvin, P. G. Harris, R. T. John, P. J. Keane, Mona M. F. Kelly, D. K. Kiersey, T. C. Kirkpatrick, G. M. O. McBrien, T. J. Macdougald, C. R. F. McDowell, J. A. O. Mulcahy, Elizabeth A. Robinson, M. S. C. Rooney, A. O. Sasegbon, E. B. Stephens, T. N. Strong, A. H. E. Thomas, D. D. Towle, T. J. C. Warriner, C. B. Wilson and J. S. Wood.

Society of Apothecaries of London

The diploma of the society has been granted to the following: T. L. Benson, C. P. Brown, D. M. Carnegie, P. L. G. Cole, P. S. Hollings, D. B. Lawrence, P. S. Pegum, A. J. M. Reese, W. Sommer, C. T. Tahil, R. M. B. Talbot and B. E. O. Williams.

Royal Society of Tropical Medicine and Hygiene

At 26, Portland Place, W.1, on Wednesday, July 14, at 4·30 PM, Sir Harold Scott being in the chair, a discussion on modern drugs in the treatment and prevention of tropical diseases will be opened by Colonel S. P. James, FRS, followed by Dr. F. Hawking.

Royal College of Surgeons of England

Election to the Council.—On July 1 five fellows were elected to fill the vacancies caused by the retirement of Sir Cuthbert Wallace and Prof. Seymour Barling, by the death of Mr. L. R. Braithwaite, and by the resignation of Mr. Sampson Handley and Sir Hugh Lett. The result of the poll was as follows:—

	Votes
P. H. MITCHINER, (St. Thomas's)	509
REGINALD WATSON-JONES (Liverpool)	480
J. PATERSON ROSS (Bart's)	474
A. TUDOR EDWARDS (London Hospital)	457
LAMBERT C. ROGERS (Cardiff)	376
S. Gilbert Barling (Birmingham)	375
L. R. Broster (Charing Cross)	335
Sir Lancelot Barrington-Ward (Gt. Ormond Street)	317
J. B. Hunter (King's)	314
R. Milnes Walker (Wolverhampton)	307
P. [illegible]	268
A. [illegible]	220
St. [illegible]	188

In all 1190 fellows voted; in addition 20 votes were found to be invalid. Major-General Mitchiner, Mr. Watson-Jones and Prof. Paterson Ross are all elected for the full period of 8 years. Mr. Tudor Edwards is elected as a substitute for 7 years and Prof. Lambert Rogers as a substitute for 2 years.

Society of Medical Officers of Health

The annual general meeting of the fever hospital medical service group will be held at Tavistock House, Tavistock Square, London, W.C.1, at 3 PM on Friday, July 16. A discussion on recent advances in laboratory control of typhoid and paratyphoid fevers will be opened by Mr. A. Felix, D SC, FRS (Vi-phage typing and Vi-agglutination test) and Dr. W. H. Bradley (application of phage typing to epidemiology of enteric infections). All interested are invited.

Mass Radiography in the United States

Since the outbreak of war, the US Public Health Service has radiographed nearly 250,000 people, and the number may rise to 2,000,000 before the end of the year. It is stated that the incidence of significant tuberculous lesions found is rather more than 1 in 100. In 55–60% of the persons affected the lesions have been in the early stages, which can usually be treated without sanatorium care. From 35 to 45% have been moderately advanced, and only 3–4% far advanced. The X-ray units of the service employ portable 35 mm. photofluorographic equipment. Each is staffed by a medical officer, a technician and a clerk and has equipment for exposing and processing from 300 to 500 X-ray films per 8-hour day. Special attention is being given to shipyards, ordnance plants, air depots and other essential establishments without facilities for radiography.

L. & C. Medical Protection Society

At the annual meeting on June 16, Sir Robert Hutchison, presiding in the absence of Sir Cuthbert Wallace through illness, said that more applications for help had been received than in the previous year, fortunately without expensive litigation. He besought members to give full information at the very outset about cases in which they were involved and not to neglect the safeguard of keeping accurate records. Once again he emphasised the prudence of having an X-ray picture taken on the least suspicion of fracture. Finally whatever view was held about the coming of a state medical service, doctors must not suppose that in such a service they would not still be liable at law and would not require to defend themselves against complaints by patients or others. Mr. W. M. Mollison, hon. treasurer, reported an excess of income over expenditure for the year of £6000, of which £4000 had been put to accumulated funds. Sir Cuthbert Wallace was re-elected president, and the retiring members of council—Dr. Thomas Beaton, Dr. P. B. Skeels, Mr. E. Rock Carling and Mr. M. A. Rushton—were re-elected. Wing-Commander R. W. Durand was re-elected secretary. Mr. Mollison proposed and Mr. G. F. Stebbing, chairman of council, seconded a vote of thanks to the staff under circumstances of peculiar war-time difficulty. Messrs. Le Brasseur and Oakley, re-elected solicitors, endorsed what the chairman had said about the need for protection, even in the event of a state medical service, for calls on the society arose not only in regard to professional practice, but to personal matters, libel, slander, divorce, and all sorts of allegations affecting the doctor's reputation.

[illegible] short supply owing [illegible] should not be taken [illegible] available for export.

ANAEROBIC INFECTIONS OF WAR WOUNDS IN THE MIDDLE EAST*

J. D. MacLennan, M D Aberd
Major RAMC

In the classification of bacteria, anaerobiosis is probably as helpful and as limiting a criterion as pigmentation or stature would be if applied to man. This is important to remember, for there is a widespread impression that the anaerobes constitute a small and highly dangerous group of organisms, rarely found, difficult to grow, and productive only of spores, bad smells, tetanus and gas gangrene. Nothing, of course, could be more inaccurate: anaerobiosis is a property common to all classes of micro-organisms—there are obligatory anaerobic cocci and bacilli, spore-bearers and non-spore-bearers, spirilla, spirochætes and actinomyces, gram-positive organisms and gram-negative, and only a very few of these are in any way pathogenic. Moreover, of this small collection of pathogens, all or nearly all require special environmental conditions in their host before they can produce those effects that we speak of as disease, before indeed they can even grow. In fact the very word "host" is not strictly accurate, for the vast majority of these organisms, including those of medical and veterinary importance, are primarily and essentially saprophytes—the fact that a few of them can produce highly lethal ste

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ole and the spore-bearers in particular are so widely distributed in nature—in soil and sand, in dust of all kinds, and in the alimentary tract of many animals—that their absence from war wounds is a matter for surprise rather than satisfaction, their presence for resignation rather than alarm. Anaerobic infections are not bacteriological but clinical entities—a point that has been frequently emphasised but is not yet sufficiently widely appreciated. The same pathogenic anaerobe can cause widely different conditions: thus *Clostridium welchii* may equally well be found in a healthy wound and in a man dying from gas gangrene; ns differing considerably in n identical clinical picture, caused by *Cl. œdematiens* a

From these remarks it must be clear that the classification of anaerobic infections will have to be made on clinical grounds, and on this basis the following types of wound infection can be recognised:—

1. Simple contamination
2. Anaerobic cellulitis
3. Anaerobic myositis —
   (*a*) Clostridial ("gas gangrene")
   (*b*) Streptococcal.
4. Postoperative synergistic gangrene.
5. Fusospirochætal infection.
6. Tetanus

THE CLINICAL PICTURE

Simple Contamination

As has already been indicated, the very ubiquity of the anaerobic bacteria renders their presence in a wound a matter of probability; indeed, in the battlefields of Western Europe this was to all intents a certainty, and any but the most trivial wound contained clostridia.

they were un- be recognised lostridia have pathogenic, but the predominating flora in these simple contaminated wounds have been clostridia of the non-gelatinolytic hese by themselves seem general odour of putrefaction; there may be some mild toxæmia, but in all such cases the whole clinical picture is much obscured and modified by the concomitant aerobic flora. Unless there is gross infection with the pyogenic cocci, the anaerobes as a rule disappear rapidly from the wound (though not so rapidly as the aerobic spore-bearers), occasionally, however, and especially in the presence of coagulase-positive staphylococci, some strains may persist for long periods, and definitely appear to delay healing. This is a notably the case with *Cl. welchii*. In no instance, it must be emphasised, is there any real invasion by these organisms; they are proliferating in dead material within the wound—in necrotic muscle and cellular tissue, blood clot, even in pus. Although of negligible importance in themselves, it is from such simple contaminations that the more serious forms of anaerobic infection arise.

Anaerobic Cellulitis

In about 5% of these contaminated wounds (notably but not invariably where there has been fairly severe woundi
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circumscribed character, for these organisms are still limited to the depths and crevices of the wound and the tissue spaces leading therefrom; the muscles are not involved. It is true that in some cases clostridia may be demonstrated in muscular tissue, but this is dead muscle already killed by trauma or vascular damage. The anaerobes continue to multiply and spread in the cellular connective-tissue, however, and as they grow they produce gas both by proteolytic and saccharolytic enzymes; tl
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toxigenic clostridia, they none the less produce a very definite clinical picture.

Such infections vary from a "gas abscess" to the extensive involvement of a limb. The incubation period is usually more prolonged (3–4 days or more), the onset invariably more gradual than in true gas gangrene. There is as a rule little systemic disturbance; the temperature may be slightly elevated, the pulse a little fast, but unless there is marked sepsis there is no very severe toxæmia, and unless it be from other causes, no shock. Locally one finds a dirty wound, a foul odour, and a moderately profuse brownish seropurulent discharge. Occasionally when anaerobic cellulitis occurs in a tightly sutured wound (as it quite often does) there may be considerable local discomfort, but in the absence of this or other obvious cause, severe local pain and tenderness are much more suggestive of gas gangrene. Gas is, of course, always present and is a prominent feature, extending diffusely between the muscle groups, crackling in the subcutaneous tissues, and bubbling up through the clot and discharge of the wound, but never, it should be emphasised, to be found intramuscularly. The presence of this gas must be regarded as of importance in the differential diagnosis; if it is abundant, extensive, and easily demonstrable, and there is no pronounced toxæmia, the condition is almost certainly
., within reasonable limits, the
tter the prognosis. There is
of the skin, and unless it be due to trauma little or no œdema. Inspection of the wound at operation may reveal some dead and dying muscle, but it will be clear that this death of tissue has been brought about by violence rather than bacterial invasion, the gangrenous areas, if they exist, can readily be removed, leaving behind a clean and healthy wound cavity. The muscles, even in areas tympanitic with gas, are perfectly normal and contractile.

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y, Middle East Forces, and

It is perhaps worth mentioning here that the above clinical picture can be very much modified should hæmolytic streptococci be present : the patient is more toxic, the wound more painful and tender, the skin sometimes coppery in colour and diffusely œdematous. In such cases the differentiation from gas gangrene may be rather more difficult ; it should never be impossible if the essential criterion of muscle involvement is borne in mind. It is, however, extremely important that this last type of case should be recognised early, for some undoubtedly develop into true gas gangrene.

Anaerobic Myositis

In a small number of cases—about 1·5% of wounds containing anaerobes and perhaps 0·4% of all wounds—infection is not limited to the tissue spaces and necrotic debris. All the related tissues are invaded, usually with appalling rapidity ; above all, muscle is involved. Nearly always it is the spore-bearing anaerobic bacilli—the clostridia—that are implicated ; in a small percentage only anaerobic cocci are to be found. These two varieties of infection will be considered separately.

CLOSTRIDIAL MYOSITIS—GAS GANGRENE

This condition differs from those already described in two important features : it is essentially an infection of living muscle, and one or more of the toxigenic clostridia is always involved. Why in some wounds these organisms remain as harmless saprophytes while in others they suddenly develop the most extreme invasive powers is a complex problem outside the scope of this report. An essential factor, however, is that there should be some muscle damage, no matter of what nature or how trivial ; it is in this area of abnormal reactivity that the anaerobes gain a footing. Once established, the mere production of toxins ensures their continued and rapid spread.

Gas gangrene is an acute infection, usually with a short incubation, always with a sudden onset. In the Middle East the disease has developed as soon as seven hours after injury and as long as six weeks ; in 90% of the cases symptoms have appeared within seven days of wounding, in 65% within three. (For reasons that will later become apparent, the average incubation period in most other theatres of war is likely to be rather shorter).

The earliest symptom, before even signs of toxæmia can develop, is nearly always pain at the site of injury. Normally when lying easily in bed a wounded man should not be in much discomfort, and the sudden onset of pain, sometimes so sudden as to suggest a vascular catastrophe, should always make one consider the possibility of gas gangrene. In a few cases, before pain has appeared, a sense of weight in the injured part has been complained of, and this has affected not only the limbs but even an amputation stump. Although this has proved to be much the earliest symptom and is in itself extremely suggestive, it has not been found in all cases ; its probable significance will be discussed later. Once established, the pain steadily increases in severity, and in untreated cases disappears only shortly before death. Accompanying it is a progressive swelling and œdema of the affected part and a profound and increasing toxæmia. Although hyperpyrexial cases are by no means uncommon, the temperature is seldom very high and the pulse, at first of fair volume, only gradually deteriorates ; yet from very early in the disease the patient is obviously profoundly ill. In about half the cases the typical bright-eyed, excessively alert, apprehensive appearance has been observed ; in the others there has been a wide variety of mental reactions—acute mania, low muttering delirium, or, quite frequently, complete, almost apathetic normality. The patient is usually pale and sweaty, occasionally he may be flushed ; essentially as a terminal event, jaundice may be noticed.

Examination of the injury early in the disease may reveal remarkably little : there is obvious œdema in the neighbourhood of the wound and this area is extremely tender ; there is usually a thin watery discharge, but gas is never pronounced, and at this stage it is often absent. Should the case be watched for another hour or so the area of œdema can be seen to be increasing rapidly, a few bubbles of gas may be expressed from the wound and a peculiar sweetish smell noticed. In my experience this smell is not necessarily diagnostic of gas gangrene ; indeed, on theoretical grounds there is no reason why it should be. It is only fair to add that several experienced surgeons are quite convinced that there is an odour about gas gangrene that is quite pathognomonic. However, it is quite certain that gas gangrene can occur without any obvious odour. This does not appear to be very widely recognised, and several cases have been neglected for twelve hours and more "because no smell was noticed."

In a large number of cases there is a profuse serous or serosanguineous discharge from the wound, quite sufficient to soak through the dressings and bedclothes and occasionally to produce hæmoconcentration. It is a feature that is highly suggestive, if not of gas gangrene, at any rate of anaerobic myositis. In the early stages there is little if any discoloration of the skin unless there is an associated infection with hæmolytic streptococci. Later, with the increasing swelling and tension, the skin often becomes white and marbled ; only as a terminal event, or in fulminating cases, or occasionally in those with multiple wounds, does one see massive discoloration with the formation of blebs and bullæ. The colour may vary from mere reddening (never very extensive if not streptococcal) through brown and green and yellow to blackening and extensive sloughs. It is very rare for the skin involvement to be as extensive as that of the underlying muscle. In untreated cases the swelling and œdema increase, vomiting and hiccough may develop, and the patient dies in a state of profound shock. It is noteworthy that the gross swelling and œdema are usually sufficient to mask to a great extent any gas production. Indeed, this is never so conspicuous a feature of the disease as the name would suggest.

It is only at operation that the characteristic muscle changes are to be observed. In the earliest stages there may be little apart from œdema and pallor ; but later the colour alters, the blood-supply is lost, contractility disappears, and gas may be demonstrable. Finally, in neglected cases the muscles become diffusely gangrenous, dark purple or black, friable, almost deliquescent.

It will be found, however, that certain features of the disease—notably the reaction and appearance of the infected tissues—vary from case to case : the reason for this constant inconstancy is fairly obvious. It has already been pointed out that in gas gangrene we are dealing not with the saprophytic clostridia but with one or more of the relatively few histotoxic species. These number ten—*welchii, œdematiens, septicum, histolyticum, bifermentans, fallax, chauvœi, carnis, difficile,* and *hæmolyticum*—of which only the first six have been isolated from infected wounds in man. To some extent each of these pathogenic anaerobes produces a different clinical picture.

In the past *Cl. welchii* has been so much the commonest pathogen in gas gangrene that it has been extremely rare to find cases in which it was not present either alone or with some of the other toxigenic clostridia, and because of this the differentiation on clinical grounds of the various bacteriological types of gas gangrene has scarcely been attempted. For reasons to be discussed later a number of cases have occurred in the Middle East in which some of the less common anaerobes have been present either alone or with purely saprophytic species. So far as is possible these various types of infection will now be described.

(i) *Cl. welchii.*—Little need be said here of the clinical picture of this infection—it is the classical type of gas gangrene and has coloured all descriptions in the literature. The incubation period is usually very short; from 50 cases in which *Cl. welchii* was the only pathogenic anaerobe present the average time from wounding to the onset of symptoms was 23 hours, the limits 7 hours and 3½ days. Gas production is more marked than with any other type of infection and the muscles more pulpy friable. In the early stages the muscles are paler normal, a lustreless pinkish-grey, but later and especi in the very acute cases they develop a peculiar characteristic slate-blue colour. Œdema is not ve marked and is more pronounced in the subcutan tissues than the muscles. There is only a moderately profuse discharge from the wound and this is quite blood-stained, and if proteolytic organisms are present a peculiar sweet pungent smell. The skin m show some coppery discoloration in the neighbourho of the wound, but unless it is of streptococcal origin tends to be a terminal event. Hyperpyrexia hæmolytic anæmia are much commoner in *Cl. welchii* infections than in any of the other types.

(ii) *Cl. œdematiens*.—In 25 cases this was the sole pathogenic anaerobe; in one it was the only clostridium present. On the whole the clinical picture is one that is easily recognisable. The incubation period in these cases has been rather long—the average was 5·25 days (and this excludes a quite exceptional case with an incubation period of 6 weeks). In only one instance was it less than 2 days.

In five cases the first symptom was a feeling of weight in the affected limb (in one case an amputation stump), followed in 2–8 hours by considerable local pain. It is thought that this sense of weight may be of early diagnostic importance, for it has been noted in only four other cases of gas gangrene, and in each of these *Cl. œdematiens* was present. It should be added that information on this point is still somewhat meagre, for its possible significance only gradually became apparent. After the onset of weight and pain there rapidly appears a very marked œdema and with it usually a very profuse yellowish or brownish-yellow serous discharge from the wound, which is rarely if ever bloodstained.

Gas has never been an obvious feature in these cases: in six it has not been seen at all and in eleven has been very slight. Unless there is gross contamination with other more proteolytic organisms there is little odour, in fact one case was quite definitely missed for 24 hours "because there was no detectable smell." The skin is œdematous, tense and white; as a terminal event there may be some brownish discoloration and more rarely Œdema is by far the most ype of infection. It extends nvolves all tissues, and only areas of hæmorrhage. The muscles are grossly swollen, shiny, and at first rather firmer than normal. To begin with they are very pale, but later they become dark purple, friable, almost deliquescent.

The general condition of the patient is poor—a toxæmia quite out of proportion to any obvious local lesion. The pulse is rapid and of poor volume, the blood-pressure low, even early in the disease, the temperature rarely raised above 100° F. Where there has been much serous oozing there may be some hæmoconcentration—hæmoglobin readings as high as 130% have been recorded. ght; neither the excessive on the one hand nor the he other. In one case acute mania developed: in three it has been observed that apathy and lack of fight in the "toxic" and "virulent" forms y Weinberg and Seguin could not uncomplicated cases the disease primarily a toxæmia with little local reaction apart from swelling.

(iii) *Cl. septicum*.—In the Middle East only seven cases f simple infection with this organism have been cognised, and I did not have an opportunity to xamine any of these personally. Hence it would be angerous to generalise, and the following details are iven with considerable reserve.

The incubation period has been slightly longer than with *Cl. welchii* infections, the average being 2·75 days. dema has always been fairly prominent, but gas production has been slight and in one case absent. The muscles are described as being bright red or brick red, one case with a mottling of purple superimposed. ere is no mention of any obvious serous discharge nor Information about the is slight. in two cases been one of the earliest ms of infection, but there is no indication that this has r been exceptionally severe, nor are specific details the exact nature of the toxæmia available.

(iv) *Cl. histolyticum*.—This has been found as the sole ecting agent in only one case—an Italian prisoner of r, moribund on admission to hospital. The terminal ture was in every way similar to that produced in the gh of a guineapig experimentally, that is, a rapid and reme digestion and liquefaction of all the related soft ues.

t is perhaps worth mentioning here that *Cl. histolyti*- has occurred along with other pathogenic clostridia in nine cases of gas gangrene, all of which were fatal. There was a considerable diversity of flora in these cases, and no safe conclusions can be drawn from the rather scanty clinical details available; but it is noteworthy that in the five cases in which mention has been made of the appearance of the infected muscles they are invariably described as being very dark in colour—"dark red," "purple," or "black"—and of a very soft consistency. Digestion of tissue was apparently not observed.

(v) *Cl. bifermentans*.—This is a relatively rare pathogen, and has been the sole infecting anaerobe in only one case. Unfortunately the clinical data are too meagre to permit of any useful description.

(vi) *Cl. fallax*.—The one case in which this organism has been found alone was, according to the surgeon in charge (Major J. K. Elliot, NZMC), quite unlike any gas gangrene he had seen before. The following are his case notes.

The patient was a Maori and was wounded at El Alamein.

July 22, 1942.—Shell wound lower leg with compound fracture tibia and fibula. Tourniquet in RAP. Sulphanilamide powder insufflated and wound dressed at advanced dressing station. Amputation in main dressing-station, with flaps cut but not sutured, and sulphanilamide powder insufflated. Transferred and evacuated by air. Had sulphapyridine tablets during evacuation.

July 23.—Admitted to general hospital. General condition satisfactory. Stump tightly bandaged with 'Elastoplast.'

July 25.—Condition much deteriorated. Pulse suddenly elevated, cyanotic tinge, restless and slightly disorientated. No smell from dressings. Pulse 130, temp 102 F., respirations 32. Operation (Major Elliot) under 'Pentothal.' Skin healthy in appearance. Flaps lifted back, all muscles and tissue in stump healthy and bleeding except the anterior tibial group, these were pale, greyish pink, did not bleed and did not contract. The muscles showed the same change throughout their entire length and were excised in toto exposing healthy bleeding tissue. In the muscle there was marked œdema and a peculiar fishy odour, quite unlike the usual smell of anaerobic infections. No obvious gas. Wound insufflated with sulphathiazole and left open. No discharge.

July 26.—Pulse 90. Looks and feels well. July 30.—Quite well, stump dressed, quite clean, three sutures inserted to close upward prolongation of wound.

Note.—Details of postoperative chemotherapy and sero therapy have been omitted as irrelevant here.

STREPTOCOCCAL MYOSITIS

During the present investigation it gradually became

tion, œdema, serous exudate, gas-formation, local pain and generalised toxæmia. Neglected cases would progress to true gangrene of muscle and ultimately to death. A preliminary report on this condition has already appeared (MacLennan 1943), but since then several additional cases have been seen and more information obtained concerning the ætiology. There can be little doubt that the primary causative organism is an anaerobic streptococcus, most probably belonging to the group A of Prevot (1925) and Colebrook and Hare (1933). Of the 19 cases now recognised, anaerobic streptococci have been cultured from 15. The 4 remaining cases were among the earliest in the series; that is to say before the import- s had ed for from typical cases. It is noteworthy that when these cocci have been found in cultures from the infected muscles aerobes, of which the most important have been *Str. pyogenes* and *Staph. pyogenes*, have always been present also. In 3 cases anaerobic streptococci have been recovered from the blood stream.

The incubation period of this condition has varied from two to nine days, the average being between three and four. The onset is usually fairly insidious with swelling and œdema appearing round the site of the injury and gradually extending diffusely; as this increases pain sets in and rapidly becomes severe. Thereafter progress is rather more rapid; the condition, however, is much less acute than gas gangrene. There is generally some elevation of pulse and temperature (sometimes to a considerable degree), a slowly progressive toxæmia, and often some mental upset—disorientation or mild delirium, never mania. The blood-pressure is not as a rule much depressed until shortly before death, nor has intense shock ever been noted. The patient is flushed and sweaty rather than pale; in one case jaundice developed, but autopsy showed that it was due to a toxic hepatitis.

Locally one finds a wet, smelly, and unhealthy wound, surrounded by a rapidly advancing area of swelling, and discharging large quantities of a thin blood-stained seropurulent fluid. The œdema, which is probably the most prominent feature of this type of infection, is moist rather than gelatinous, may show hæmorrhagic areas, involves all tissues, and is especially obvious in the muscles. These at first show little change apart from bogginess and pallor; later they become bright red, then dark purple, swollen, pulpy, and friable. In one fatal case there was a peculiar striped effect with alternate bars of bright and dull red. It is only very late in the disease that the muscles fail to bleed or to contract on stimulation. Occasionally a quite characteristic slimy swelling and greenish discoloration of the fascia and intermuscular septa may be seen, but this has not been a constant finding. Invariably there is gas production, but this is rarely very pronounced and is to a varying degree masked by the associated œdema. It can definitely be shown to be intra- as well as inter-muscular in its distribution, and has a rather typical sour smell, which is neither so sweet nor so pungent as that developed in clostridial infections. In most cases there has been a conspicuous and rapidly spreading cutaneous erythema, and this is always more extensive than the infection of the deeper tissues. Fatal cases go slowly down hill with a gradually increasing toxæmia, but there is no particular and specific termination. In the five cases of the present series the causes of death have been bronchopneumonia, toxic hepatitis, hæmolytic streptococcal septicæmia, anaerobic streptococcal septicæmia, and "generalised toxæmia."

It should be emphasised that this disease may vary considerably with the secondary infecting organisms. Should *Str. pyogenes* be present the condition is usually more acute and cutaneous erythema is prominent; the staphylococcal cases tend to be more insidious, often with a white boggy œdema as the presenting symptom.

Other Infections

Postoperative Synergistic Gangrene.—This condition, first described by Cullen in 1924, and since studied in detail by Meleney (1924, 1931, 1933), is too well known to require detailed description here. Briefly it is a spreading and very intractable cutaneous gangrene which occasionally follows operations on the thoracic and abdominal viscera. It is caused not by a single organism but by two—a hæmolytic strain of *Staph. aureus* and an anaerobic or micro-aerophilic streptococcus—acting in symbiosis. It is not a common infection. There are records of only three cases in the Middle East Force. I saw two of these: they differed in no way from Meleney's now classical description.

Fusospirochætal Infections.—Apart from simple skin lesions—gangrenous balanitis, tropical ulcers and the like—infection of wounds with fusiform bacilli, with or without spirochætes, has been very rare in the Middle East. *Fusiformis fusiformis* has been isolated three times—twice from simple contaminated wounds and once from a case of gas gangrene, and seen but not isolated on three or four other occasions. It never appeared to be producing any clinical effect, and certainly did not delay healing. One gunshot wound of the arm (not seen by me) became infected with both fusiform bacilli and spirochætes and is described as having contained a very foul greenish pus and of smelling like a case of Vincent's stomatitis. There was only a minor degree of systemic disturbance. Unfortunately the subsequent history of this case is not known.

Tetanus.—The whole question of tetanus infections in the Middle East has already been reviewed (Boyd and MacLennan 1942). It must always be borne in mind that in the absence of clinical tetanus, toxigenic strains of *Cl. tetani* are quite often to be found as part of the anaerobic flora of war wounds.

(To be continued)

MARCH FRACTURE

A SERIES OF 15 CASES FROM THE RAF

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SINCE 1855, when Breithaupt, a Prussian military surgeon, first described *Fussgeschwulst*, the *pied forcé* or "march fracture" has attracted attention in time of war. To Stechow (1897) must go the credit of first recognising the condition radiographically. Despite a good many reports, it is still commonly regarded as a rarity; the numerical force of published series is small; the textbook descriptions of symptomatology are various and inaccurate; the recommended treatment is cumbrous and unnecessary; and there are some five theories of causation.

The 15 examples presented here were all collected in my surgical outpatient clinic within the short period of 3 months, from a mixed RAF population of about 4000. They present some striking features in common, some of them at variance with accepting teaching.

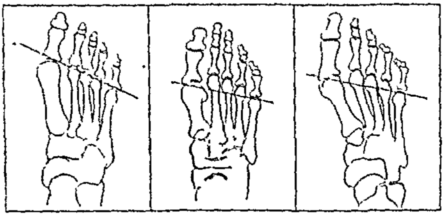
The classical description of march fracture is more or less as follows: the young soldier, previously of sedentary occupation, feels after a long route march a pain in his foot (variously located in the metatarsal region by different authorities), which may according to Brandt (1941) and others be of acute or insidious onset. If he is radiographed nothing may at first be manifest; if radiography is repeated in some 10 days a cloud of callus is seen about the shaft of the 2nd, 3rd or 4th metatarsal. The treatment recommended by all standard textbooks is immobilisation in a walking plaster cast. According to Nion the vast majority of fractures affect the 2nd or 3rd metatarsals in almost equal proportions. The usual accepted age-incidence is 20–30, and its military aura has made it (in the past) an almost exclusively male complaint. But in the series of 10 civilian cases reported by Meyerding and Pollock (1938) no less than 7 were women; and the average age was 40.

Ætiology.—In 1887 Pauzat suggested that the fractures were caused by constant bruising of the soldier's feet by the dorsal fold of army boots, resulting in a periostea proliferation around the metatarsal shafts. Murk Janse (1926) held that it was an ischæmic phenomenon, the result of spasm of the interossei, leading to vascula obstruction and œdema of the periosteum and soft tissues This in turn caused first a decalcification of the affect bone rendering it liable to fracture, and secondly a depo of new bone in the same area. McMurray (1937) favo a preliminary disorder of the foot, such as metatarsal (i.e. a flattened short tarsal arch) and remarks that ach commonly precedes the fracture by a considerable peri and is often not made appreciably worse by it. relationship with metatarsalgia has also been stress by Dodd (1933) and Morton (1927, 1928, 1930, 1935).

Brandt summarised the causes by saying "the fractures are the result of rhythmically repeat subthreshold mechanical insults acting by summati to a point beyond the capacity of the bone to bear stres He regarded "predisposing factors" as by the wa In 1933 Dodd had examined an undefined number radiograms published by previous writers, and fou architectural abnormalities associated with the fractu in every case; and in 1937 Bruce published 12 exampl all of which showed clear structural and developmen stigmata providing a simple mechanical explanation march fracture.

An essential preliminary to the recognition of the abnormalities is a clear conception of the normal fo Bruce writes: "A normal metatarsal segment is one which the five metatarsal bones are arranged in ra formation, and with the head of the first metatarsal the same transverse plane, or even a little more l than that of the second." This means that the wh metatarsophalangeal segment operates in man as a sin joint, and this arrangement has been reached by a and progressive adaptation to the erect posture fr arboreal life, so that all deviations from it are essentia atavistic.

In pronograde primates the foot presents, as does t human hand, two discrete metatarsophalangeal segmen a short, widely abducted, highly mobile hallucial, a lengthy composite digital, the long axis of the foot ta



Showing the line of flexion at the metatarsophalangeal joints in (a) normal foot; (b) foot with short 1st metatarsal, and (c) foot with abducted 1st metatarsal.

the line of the 3rd metatarsal. The evolutionary modi- [illegible] foot is an adduction and [illegible] segment, a reduction in the [illegible] segment, and a shift of the long axis to Morton's "humanoid line," that is, between the 1st and 2nd metatarsals. In the human foot the following further modifications occur:

1. The first metatarsal is completely adducted, and equals in length the longest metatarsal of the digital segment.
2. It undergoes hypertrophy and has the stoutest of the five shafts.
3. It becomes fixed.
4. The other metatarsals decrease in length, and their shafts become almost parallel.

Any deviation from this ideal results in abnormal mechanical stresses falling across the necks of the 2nd or 3rd metatarsal shafts. The commonest in this, as in other, series is Morton's "metatarsus atavicus" where the first metatarsal remains short. It may also be abducted, and is very commonly hypermobile. Any of these extremely common atavisms cause a shift of stress to the 2nd and 3rd metatarsals, a stress which under normal conditions is compensated by increased muscular tone. When this tone fails as a result of unaccustomed and exceptional strain (such as is experienced by the new recruit who has left his clerk's desk and shoes, for the assault course and ammunition boots) the slender necks of the 2nd or 3rd metatarsals are left bare and extended for the *coup de grâce.*

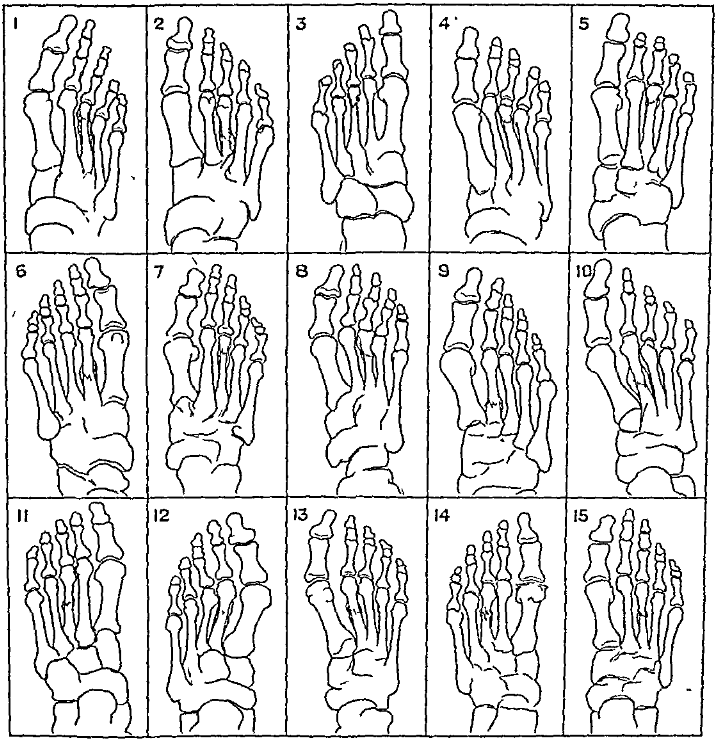
CASE-HISTORIES

CASE 1.—A corporal, aged 31, a shop assistant in civil life who stood most of the day, had been doing sedentary work in the Service until he was transferred to [illegible] on the dorsum of his foot, becoming progressively more severe He had never had pain in the foot before, and his foot was normal in appearance except for some œdema on the dorsum and sharply localised tenderness over the neck of the 3rd metatarsal. X rays at first showed no lesion beyond a short and somewhat abducted 1st metatarsal; 10 days later a typical march fracture of the neck of the 3rd metatarsal was visible, which healed soundly in 4 weeks. For the first 3 weeks his foot was strapped, he was ambulatory, and performed light duties. At the end of this time his pain had disappeared, and he returned to full duty. He has never had pain in the foot since.

CASE 2.—A recruit, aged 19, a tool-maker in [illegible] He had never had pain in the foot before. It persisted for about a month, at the end of which time he reported sick for the first time. X rays showed the typical callus formation about the shaft of the 3rd metatarsal, denoting a healed march fracture. The first metatarsal was hypermobile, and the shaft of the fourth was markedly hypertrophied. The foot was otherwise normal, his pain disappeared in about a week, and has never recurred.

CASE 3.—A man in the RAF regiment, aged 20, who had been a carpenter in civil life, standing most of the day, felt a sudden sharply localised pain on the dorsum of his foot while on a 9 mile route march. He had never had pain in the foot [illegible] gree pes planus with some [illegible] His first metatarsal was [illegible] a typical march fracture of the neck of the 3rd metatarsal. Tenderness was strictly localised over it, and it was treated exactly like case 1, with similar results. He has not had pain in the foot since.

CASE 4.—A man in the RAF regiment, aged 31, a bus-conductor in civil life, was on an assault course 2 days before the onset of his pain, which was strictly localised to the dorsum of his foot. He had never had pain in the foot before. X rays showed a typical march fracture of the neck of the 3rd



Direct tracings from the original radiograms of the fractures

DETAILS OF 15 CASES OF MARCH FRACTURE

Case	Age (yr)	Branch of service	Civil occupation	Occasion of fracture	Metatarsal fractured	Foot	1st metatarsal		Onset	Length of service
							Shortness	Other abnormalities		
1	31	RAF regt.	Shop-assistant	Field exercise	3rd	R	+	Some abduction	Acute	2½ yr.
2	19	Recruit	Tool-maker	Field exercise	3rd	R	None	Hypermobile	Acute	4 mth.
3	20	RAF regt.	Carpenter	Route march	3rd	L	None	Hypermobile	Acute	3 mth.
4	31	RAF regt.	Bus-conductor	Field exercise	3rd	R	++	..	Insidious	5 mth.
5	30	Recruit	Van-driver	Drill	3rd	R	++	..	Acute	2 wk.
6	19	RAF regt.	Shop-assistant	Route march	2nd	L	+	..	Acute	3 mth.
7	21	WAAF	Not sedentary	Hockey	3rd	R	++	..	Insidious	6 mth.
8	18	Recruit	Shop-assistant	Route march	3rd	R	++	..	Acute	2 mth
9	20	RAF regt.	Bench-worker	PT	2nd	R	None	Abduction ++	Acute	4 mth.
10	22	Recruit	Shop-assistant	Route march	2nd	R	+	Abduction +	Acute	6 mth.
11	20	RAF regt.	Not sedentary	Route march	3rd	L	+	Abduction +	Acute	3 mth.
12	31	Recruit	Clerk	Drill	2nd	L	+	Abduction +	Acute	7 wk.
13	18	Recruit	Clerk with ATC experience	Route march	2nd	R	+	Some abduction	Insidious	10 wk.
14	36	WAAF	Shop-assistant	Walking	3rd	L	Flattened head	Osteo-arthritis	Acute	9 mth.
15	21	RAF regt.	Miner	Walking	3rd	R	+	..	Acute	1½ yr.

metatarsal, with a very short 1st metatarsal. He was treated like case 1, and has not had pain in the foot since.

CASE 5.—A recruit, aged 30, a van-driver in civil life, complained of increasingly severe pain on the dorsum of his foot after drill. He was unable to carry on, and was kept in bed for 3 weeks, at the end of which time his march fracture of the neck of the 3rd metatarsal had healed. His first metatarsal was strikingly short. He had never had metatarsalgia, and has not had pain in his foot since.

CASE 6.—A member of the RAF regiment, aged 19, a shop-assistant in civil life, complained of sudden pain in his foot during a long route march. He had previously noticed that the dorsal crease of his boot tended to bruise his foot, but he had never had metatarsalgia. He had first degree pes planus. X rays at first revealed no lesion, but later showed a typical march fracture of the 2nd metatarsal, with shortening of the first. He was treated like case 1, and has not had pain since.

CASE 7.—A WAAF, aged 21, first noticed pain strictly localised to the dorsum of her foot after playing hockey. It later subsided, but became worse after a walk. She had never had pain in the foot before. There was œdema of the dorsum, and localised tenderness over the 3rd metatarsal. X rays, at first negative, later showed a typical march fracture with a very short 1st metatarsal. She was put into a walking plaster, and made a complete recovery in 4 weeks.

CASE 8.—A recruit, aged 18, a shop-assistant in civil life, while on a route march, noticed a sudden onset of pain on the dorsum of his foot. It was continuous, and he had never had pain in the foot before. There was œdema of the dorsum and localised tenderness over the 3rd metatarsal. X rays showed a march fracture, and a very short 1st metatarsal. He was put to bed for 3 weeks. His pain did not completely vanish until a further week had passed, but has never recurred.

CASE 9.—A member of the RAF regiment, aged 20, a bench-worker in civil life, felt a pain over the dorsum of his foot during PT. He had never had metatarsalgia, but had first degree pes planus. X rays showed a march fracture of the base of the second metatarsal. The first metatarsal was widely abducted, and hypermobile. He was given a walking plaster, in which he remained for a month. The foot was strapped for a further 10 days, at the end of which time he was free of pain.

CASE 10.—A recruit, aged 22, a shop-assistant in civil life, while on a long route march felt sharply localised pain on the dorsum of his foot. X rays showed a typical march fracture of the 2nd metatarsal, with shortening and abduction of the first. He had never had pain in his foot before. There was no pes planus, but some flattening of the short plantar arch. He was treated like case 1, with similar results.

CASE 11.—A member of the RAF regiment, aged 20, complained of pain of the dorsum of his foot, coming on during a route march. He had never had metatarsalgia. X rays showed a march fracture of the 3rd metatarsal, with shortening and some abduction of the first metatarsal. The pain subsided in the course of about a week without treatment, and the man remained on duty.

CASE 12.—A recruit, aged 30, a clerk in civil life, felt a sudden onset of pain on the dorsum of his foot during drill. He had some previous history of footstrain, but no metatarsalgia. There was œdema of the dorsum, and strictly localised tenderness over the 2nd metatarsal. A mild degree of hallux valgus was present, but no flattening of either long or short plantar arch. X rays at first showed no lesion, but there was shortening and some abduction of the first metatarsal. Before he could be investigated further, he was admitted to a medical ward for 3 weeks. He remained in bed for this period, and was free of pain in the foot when discharged. X rays at this time showed a typical healed march fracture of the 2nd metatarsal.

CASE 13.—A recruit, aged 18, a clerk in civil life, but one who had served 18 months in the Air Training Corps before joining up, woke with pain on the dorsum of his foot the morning after a long day's marching and drill. X rays revealed no abnormality except a short first metatarsal, somewhat abducted. He was given light duties and excused drill, but no other form of treatment was ordered. His pain diminished progressively, until it had almost vanished 10 days later, when he was radiographed again. A typical march fracture of the 2nd metatarsal was present.

CASE 14.—A WAAF, aged 36, a shop-assistant in civil life, felt a sudden pain on the dorsum of her foot when walking a short distance home from her work. She had had no unusual exercise that she could recall. Although there was some œdema of the dorsum, she carried on with her work as usual. The pain progressively improved, and when she was radiographed some 10 days later had almost gone. The X rays showed a healing march fracture of the 3rd metatarsal. The first metatarsal was only slightly shortened, but the head was severely flattened by osteoarthritic change. She had never had previous pain in the foot, however, and there was no other deformity.

CASE 15.—A member of the RAF regiment, aged 21, a miner in civil life, was walking along a street while on leave when he suddenly felt pain on the dorsum of his foot. During the succeeding days it became more severe, but later improved. X rays 14 days after the onset of the pain showed a healing march fracture of the 3rd metatarsal. He had never had pain in his feet before, but had a characteristically short first metatarsal. He was given light duties, and the pain was completely gone a week later.

DISCUSSION

From the strikingly similar histories a number of salient facts emerge:

1. In no case was there the slightest suggestion of metatarsalgia before the fracture.
2. In no case did pain persist after the healing of the fracture.
3. In every case pain was strictly localised to the dorsum over the affected metatarsal.
4. In all but 3 cases the pain was acute in onset, coinciding with the fracture. In the other 3 it became manifest within 24 hours.
5. In every case, except case 14, a clear-cut atavistic anomaly of the foot was present—in most instances a short 1st metatarsal. A similar mechanical state had been created in case 14 by osteoarthritic flattening of the metatarsal head.
6. Immobilisation in a walking-plaster was usually unnecessary.
7. From the number of cases collected in a short space of time, it would seem that march fractures occur under Service conditions much more often than is commonly supposed.

So characteristic and so constant are the findings, that it is quite possible to diagnose the condition confidently without the aid of X rays; but if it is desired to demonstrate the fracture radiologically, it is essential to X ray suspected feet a second time after 10 days if the primary plate is negative.

The fracture occurs when the final stress is laid upon the metatarsal during a period of exceptional exertion, and it may or may not be associated with œdema of the :sum. A walking-plaster is not indicated in most tances, tends in any case still further to decrease the ıe of the small muscles of the foot, and usually calls subsequent rehabilitation. Many fractures are questionably missed because the pain is comparatively .nsient, and they are regarded as "foot-strain" and ated—adequately as it happens—by strapping the foot. the most a period of rest in bed with graduated exeres for feet and legs will suffice.

With only 2 exceptions (and one of those a recent

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es, but had been in occupations usually regarded as nducive to chronic footstrain. No instance of recurıt fracture has so far been met, for the point of stress reinforced by healed callus. This, and the absence of her after effects, provides a good reason for not downading these patients as some Service authorities have vocated.

A disproportionately large number of the fractures curred in members of the RAF regiment, and in view Pauzat's (1887) opinion, one must record that this anch of the Service is equipped with a heavier type

rigid toecap

That such

..ch fractures

ems probable.

Finally, the absence of residual pain after the healing of ıe fractures was constant and striking. It would seem ıat the period of comparative rest ordered enabled the usculature of the foot to regain that tone which had .therto compensated its skeleton for an inherent ıatomical inadequacy.

SUMMARY

A series of 15 cases of march fracture collected over a ery short period is recorded.

All were associated with clear-cut atavism of the foot sually a short 1st metatarsal; and none with meta-

constant

tory.

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..odic Surgery, London.

References continued at foot of next column

BACILLARY DYSENTERY

CHEMOTHERAPY IN ITS TREATMENT

AN EXPERIENCE OF 492 CASES IN THE MIDDLE EAST

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TEMPORARY LIEUTENANT-COLONEL RAMC; OFFICER IN CHARGE OF A MEDICAL DIVISION

AFTER our experience of 18 months in the Middle East, covering two summers, it should be possible for us to assess the value of chemotherapy in bacillary dysentery, at least in the type of infection encountered there. In a previous paper[1] we published favourable results with sulphaguanidine after 9 months' trial; these have been confirmed by a further 9 months' use of it and experiments have been carried out with both sulphapyridine and sulphonamide. The clinical impressions, which we regard as the most important, can now be strengthened by the fairly large figures collected and by the addition of some controls. Sufficient evidence of the value of sulphaguanidine and perhaps of sulphapyridine has now been collected in this country in the local varieties of dysentery, and further contributions to the problem should come from theatres of war where different grades of severity are met with.

Table I summarises material upon which these observations have been made.

TABLE I—DIARRHŒAL DISEASES TREATED MARCH, 1941, TO SEPTEMBER, 1942; 4178 CASES

		Cases	%
Amœbic dysentery, including hepatic amœbiasis		36	1
Acute catarrhal enteritis		2313	55
Bacillary dysentery		1829	44
(Of positive isolations: Flexner 70%, Shiga 19%, Sonne 6%, Schmitz 5%)			
Treated with	Sulphaguanidine	323	
	Sulphapyridine	97	
	Sulphonamide	63	

In the Middle East dysentery has not been of a severe type and most cases would have probably recovered on expectant treatment. We can get no information of the mortality among soldiers here before the introduction of sulphaguanidine, nor of the length of treatment in hospital, nor of the proportion of cases drifting into a chronic state resembling ulcerative colitis. This makes it

A classification of the diarrhœal cases (amœbic dysentery being excluded) according to severity will give an idea of the type of case upon which our conclusions have been built. To regard all acute diarrhœal cases apart from occasional food-poisoning outbreaks as due to the same bacterial cause is simple and probably correct. A rapid sorting of cases by stool inspection shows two clearly defined groups; there is the mildest type without blood and mucus in the stools familiarly known as "Gyppy tummy" and arbitrarily called acute catarrhal enteritis; this is an unpleasant condition, often febrile, associated with considerable abdominal pain and frequently needing hospital treatment in the soldier. Even in this "mildest" type the stay in hospital of 600 cases averaged ten days. True dysentery is distinguished by the presence of blood and mucus in the stools and is a much graver disease; the average duration of stay in hospital of 600 cases chosen by random sampling from the records over 18 months was 20 days. The cases have been divided into mild, moderate and severe; but the mild cases admitted to hospital are mild only by comparison, and the sufferers are uncomfortable and ill,

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[1] Bulmer, E. and Priest, W. M. *J. R. Army med. Cps*, 1942, 79.

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while in many of the severe cases life is, threatened immediately or later from exhaustion.

TABLE II—DISTRIBUTION OF NON-AMŒBIC DIARRHŒAS ACCORDING TO SEVERITY

	Cases	Type	%
Acute catarrhal enteritis ..	2313	.. Mildest ..	56
Bacillary dysentery ..	1829	.. Mild ..	20
		Moderate ..	22
		Severe ..	2

About midsummer 1941 we abandoned the use of the purgative treatments with salts or castor oil as we regarded them as scientifically irrational and observation of control series did not show their value; we have had no reason to regret this heterodox decision and the increased comfort of the patients has been a satisfaction to them as well as to us. The standard treatment has been rest in bed, a bland diet with ample fluids, and symptomatic treatment of pain which may be very distressing, occasionally requiring morphine. In nearly 500 patients some member of the sulphonamide group has been given and the indications will be discussed below. In only 8 cases of Shiga dysentery has serum been given, since results with sulphaguanidine suggested that it was seldom, if ever, necessary.

Dysentery has been approached as an essentially clinical problem and treatment has been guided by clinical and not by laboratory indications; constant inspection of stools, and frequent appeals to the sigmoidoscope are necessary in following treatment and the chief value of the laboratory, apart from research, is in excluding amœbic dysentery.

SULPHAGUANIDINE

This drug has been available here since April, 1941, and we have been able to use it almost from the time of our arrival in the Middle East though at first it was very scarce. A standard dosage has been adopted irrespective of body-weight and as it is non-toxic huge doses have at times been given; the maximum was 350 g. but the average was 100 g., and if cases can be treated at the earliest stages 30–40 g. will suffice. The patients have had an initial dose of 6 g., followed by 3 g. four-hourly until the stools have fallen to about three daily; thereafter it has been continued in the same dose daily for two or three days. It has repeatedly been demonstrated that relapse will occur if the drug is stopped too soon. In a few of the worst cases the dosage has been 3 g. two-hourly without toxic effects.

The results will be considered under two headings. In the first group (called the selected group) it was given according to definite indications which were carefully discussed before treatment was started. In the second group it was given experimentally as a routine treatment in an almost consecutive series of diarrhœal admissions during an epidemic and within 48 hours of admission—this has been called the unselected group.

Selected group.—Out of our admissions for bacillary dysentery 232 cases were carefully selected for treatment with sulphaguanidine, the indications being as follows:

	Cases
1. Admitted in subacute or chronic stage ..	27
2. Mild group: key personnel only	45
3. Moderate group: not doing well or showing persistent symptoms or sigmoidoscopic abnormality after about 7 days in hospital	92
4. Severe group..	68

Results.—The average duration of stay in hospital was 17 days for the 205 acute cases; these included all the severest cases treated, with a very low proportion of mild cases and the period is to be compared with the average figure of 20 days in a random sampling of 600 cases chosen from the admission and discharge books and including some treated with sulphaguanidine. Two patients died, giving a fatality-rate in the 1829 cases of dysentery of just over 0·1%. One death was from exhaustion on the 15th day after admission, and he had only had one day's treatment with the drug because supplies had run out. The other case reached us from the battle front with a pericolic abscess and he was too ill to do anything for—it is not surprising that the drug was ineffective. Neither of these two deaths can be called failures of sulphaguanidine.

Two cases were invalided home. One patient had had an extremely severe form of dysentery and arrived at our hospital on the 16th day of his disease after a slow evacuation from the battle zone; he was very ill indeed, and was passing sloughs of his colonic mucous membrane. He ultimately recovered sufficiently to be invalided, but he had a condition resembling ulcerative colitis, a sequel of his dysentery. The second patient was invalided to South Africa for impairment of his general health although the bowel had recovered.

Temporary regrading: 3 patients were recommended for base duties for 3 months because of impairment of their general health.

Failures: in 5 cases we were unconvinced that the drug had any beneficial effect, but they all recovered.

Untraced: a very few patients had to be transferred to other hospitals while under treatment—the ultimate result is not known.

The remaining patients, comprising about 95% of the series, recovered completely, and their response to the drug was to the clinical observer proof of its specific action. The average number of stools at the beginning of treatment was 16, by the fifth day it had fallen to 2·3, and the stools became normal on the seventh day. Even more striking was the improvement in the patient's general condition—the distressing pains rapidly subsided and the feeling of wellbeing returned.

Subacute and chronic cases: in this group response to treatment was equally satisfactory, but it seems to occur only if the inflammation is due to the dysentery bacillus; 2 cases of non-specific ulcerative colitis with histories going back to peace-time failed to show any improvement; the drug was given by rectal instillation as well as orally.

Cases treated early: in 43 cases in this group treatment was begun within three days of the onset of the disease; the average number of stools at the beginning of treatment was 20, it had fallen to 2 on the fifth day, and normal stools were passed on the sixth day; the average dose given was 90 g.; 16 of the cases were severe, 18 moderate and 9 were mild.

Unselected group.—This group included 74 cases of dysentery and 17 of enteritis. At a time when supplies of sulphaguanidine were plentiful an experiment was undertaken of treating every admission to the dysentery wards with it, but some selection resulted from excluding very trivial cases. Thus 17 cases of "Gyppy tummy" were treated, and the duration of stay was 6 days after a dosage of 26 g.; this compares with the average figure of 10 days in hospital for 600 controls. The rest of the cases were true dysentery, one or two were severe, the remainder were mild or moderate; the average duration of stay was 10 days after a dosage of 44 g.—the figure in the control series already quoted was 20 days' stay.

TABLE III—CONTROLS COMPARED WITH DYSENTERY. CASES TREATED WITH SULPHAGUANIDINE

—	Stools per day on admission	Stools on 5th day after admission	Stools normal (days)	Stay in hospital (days)
Controls ..	20	4	9	16
Sulphaguanidine cases ..	23	2	6	11

It has been possible to collect from the records of th dysentery sections either just before or just after th experiment a control series of 36 cases of moderat severity not treated with sulphaguanidine—these ar not strict controls as had any anxiety been felt abo them they would have been given sulphaguanidine. table III a comparison is made between the controls 36 cases of moderate dysentery treated with sulphagua dine as a routine and without selection.

The series is too small to be conclusive but it is the o strict control available. The control series is of som what less severity than the treated cases but despite t each point that can be analysed shows the benefic effect of the drug; a saving of 5 days in hospital perh has the greatest importance from a military stand These results show the value of sulphaguanidine routine treatment of all diarrhœal admissions were ticable the stay in hospital would be greatly reduced; if it is permissible to compare the results in 74 cases with those in 600 controls the deduction would be that the duration of stay could be halved, and the small enteritis group suggests that a similar saving might be possible in this type too.

[illegible] treated with sulphaguani[illegible] ses up to 350 g., very few [illegible] found; the drug does not [illegible] n does kaolin; in 4 cases [illegible] ashes about the tenth day, and there has been only one serious complication, a "sulphaguanidine kidney," which cleared up rapidly after the intravenous administration of 2 pints of 4·285% sodium sulphate.

SULPHAPYRIDINE

A series of 97 cases of acute dysentery have been treated experimentally with sulphapyridine on indications similar to those of the "selected" sulphaguanidine group. The series was comparable in severity with the "unselected" sulphaguanidine group—45 were mild, 51 [illegible] evere. The conclusions [illegible] were that sulphapyridine [illegible] as its effect on the stools [illegible] ot relieve colic as quickly, [illegible] o substitute it for sulpha[illegible] supplies of this drug were short, on account of the intolerable nausea, distressing vomiting and the general feeling of illness produced by it.

The average duration of stay in hospital was 13 days which compares not very favourably with the figure of 10 days in the "unselected" sulphaguanidine group. The dosage was the usual one for sulphapyridine, and an average of 20 g. was given; one patient developed a "sulphapyridine kidney" but recovered.

SULPHANILAMIDE

When supplies of sulphaguanidine were short sulphanilamide was tried in a series of 63 patients of a severity comparable with those treated with sulphapyridine, the drug was given in the form of crushed tablets and the average dose was 20 g. The results were not good, the average duration of stay in hospital was 16 days, and 5 patients had to be put on sulphaguanidine because their response was so poor. We do not consider that this drug, in the form of crushed tablets, is of proved value in bacillary dysentery.

SUMMARY AND CONCLUSIONS

A series of 483 cases of non-amoebic diarrhoeas, the bulk of these cases of bacillary dysentery, have been treated with sulphonamide drugs.

In 323 cases treated with sulphaguanidine the average stay in hospital was substantially reduced as compared with that of 600 controls.

In 97 [illegible] d with sulpha[illegible] t the patients [illegible] se. [illegible] ide the stay in [illegible] conclude: [illegible] the treatment of acute, subacute and chronic bacillary dysentery; it is almost non-toxic and does not upset the patient. It is probable that its routine use would diminish the stay [illegible]

[illegible] rm of crushed tablets does [illegible] the disease.

[illegible] is of considerable value in dysentery but is not so effective as sulphaguanidine. Its unpleasant effects make its use undesirable unless sulphaguanidine is not available.

We would like to thank a succession of medical officers in the dysentery wards—Major J. H. L. Easton, Capts. A. J. Dix Perkin, J. N. U. Russell, A. H. Elliott, H. M. Kelsey, J. Lieber, S. H. Kutar, RAMC; Capt. A. S. Brown, IMS; the pathologist, Capt. W. F. Hamilton, and the sister in charge of the dysentery ward, Miss D. M. Petley.

It is proposed to [illegible]
of the late Brigadier [illegible]
of 40 while holding [illegible]
surgeon in the Midd[illegible]
the fund should send donations to Prof. T. P. McMurray, Medical Institution, Liverpool, 3.

SONNE DYSENTERY

SULPHAPYRIDINE IN ITS TREATMENT

ROBERT SWYER, M R C S, D P H
DEPUTY MEDICAL SUPERINTENDENT AT THE NORTH EASTERN LCC HOSPITAL

THE incidence of Sonne dysentery has recently been increasing in this country. Consequently any procedure which shortens the illness or reduces the number of carriers becomes of greater importance. Paulley[1] recorded the [illegible] cases of bacillary dysenter[illegible] lphapyridine. Most of the c[illegible] a few Shiga, Schmitz or Sonne. In groups of 43 and 30 cases the average periods in bed were 1·26 and 4·96 days respectively, with discharge from hospital usually 2 days later.

The series here described comprised 92 cases of Sonne dysentery, 57 of which were treated with sulphapyridine and 35 were used as controls. The control series was taken from the hospital records of cases occurring during the period of the investigation but who for various reasons unconnected with it received symptomatic treatment only. They were not [illegible] special scheme of rotation wit[illegible] and are therefore offered as gi[illegible] mparison only. It is of interest to compare these 57 with Paulley's series in that *Bacillus dysenteriæ* Sonne is usually regarded as more resistant to sulphonamides than the other strains.

METHOD

Except at weekends, daily bacteriological examinations of fæces and rectal swabs were done in all chemotherapy series, and twice weekly in controls, on desoxycholate-citrate agar. Treatment with sulphapyridine by mouth in doses according to age, as shown in the table, was instituted immediately on isolation of the *B. dysenteriæ* Sonne, and was continued until a negative report upon the fæces and on rectal swabbing was obtained. Administration of the drug was then [illegible] rther [illegible] roved [illegible] imum [illegible] had been obtained, when provided the stools appeared normal and the general condition was satisfactory the patient was allowed up and discharged in the course of a day or two. If after 48 hours the stool or rectal swabbing reverted to positive the routine course of treatment was repeated. Careful watch was kept for toxic symptoms of chemotherapy; granulocytopenia being guarded against by white-cell counts taken at intervals of a few days.

CLINICAL FEATURES

As is common with Sonne infections there was little or no toxæmia or dehydration in either the chemotherapy or control groups. In the former, initial pyrexia ranging from 100°–10[illegible] 4 cases and [illegible] instances. [illegible] of 3 days by [illegible] group and by 15 in the controls. Nearly all patients passed mucus in the early stages, but whereas the stools rapidly became normal in appearance in the drug-treated cases [illegible]

[illegible] drug-treated cases).

Criteria for discharge were that the patient must be physically fit, passing normal stools and with *B. dysenteriæ* Sonne absent from 3 consecutive stools and rectal [illegible]

[illegible] way intermittent convalescent-carriers were detected.

Relapses.—In the chemotherapy series bacteriological relapses from negative to positive necessita[illegible] second course of the drug occurred in 3 cases [illegible] first

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1. Paulley, J. W. *Lancet*, 1942, ii,

DOSAGE AND TIME REQUIRED FOR BACTERIOLOGICAL AND CLINICAL CURE

Age in years	Cases	Av. amount sulphapyridine (g.)	Av. length of treatment (days)	No. of days to clear organisms from fæces			Av. period stools clinically abnormal (days)
				Longest	Shortest	Average	
			CHEMOTHERAPY CASES				
0– 1	11	9·6	7	16	1	6·	19
1– 2	14	8·1	4·7	10	1	3·3	10
2– 3	11	11·8	5·5	11	1	5·3	3
3– 4	5	11·4	4·6	3	1	2·2	5
4– 5	5	17·9	7·8	15	2	7·2	3
5–10	2	14·5	6	12	2	·7	1
Over 10	9	34·7	8·1	15	1	5·4	3
—	57	14·6	6	16	1	5	9
			CONTROLS				
0– 1	7	..	..	81	7	28·5	33
1– 2	10	..	..	54	6	20·3	28
2– 3	4	..	..	55	11	29	19
3– 4	1	..	..	..	..	17	3
4– 5	..	..	..	..	..	..	..
5–10	3	..	..	35	6	19	10
Over 10	10	..	..	23	7	15	8
—	35	..	..	81	6	21·1	20

examination (2–3 days) after cessation of treatment. In no case did such relapse arise at a later stage. Among the controls however, changes from negative to positive took place in 6 instances at periods ranging from 7 to 36 days. Thus some of these patients became convalescent carriers.

Complications.—The most interesting complication was in a 9-months-old girl in the chemotherapy group who was admitted with a typical attack of dysentery with blood and mucus in the stools, and a keratitis accompanied by a small ulcer just below the centre of the pupil with some degree of iridocyclitis in the right eye. The other eye remained unaffected. *B. dysenteriæ* Sonne was isolated from swabbings from the conjunctival sac and the fæces. The child had contracted dysentery while accompanying her parents on a hop-picking expedition, and in all probability infection of the eye was manual. Treatment was by sulphapyridine internally (1 g. daily divided into 4 doses for 12 days) with 2% atropine drops locally; and though it took 50 days to obtain full and regular dilatation of the pupil, the condition on discharge was normal except for a very small scar at the site of the corneal ulcer.

Other complications were connected with the respiratory tract and included otitis media and mild bronchitis in a few instances, mostly among the controls. The infecting organisms were staphylococci, hæmolytic streptococci and pneumococci in that order of frequency.

TOXIC MANIFESTATIONS OF CHEMOTHERAPY

Although numerous total and differential white-cell counts were made, no blood changes of real significance were encountered. The most considerable was in a boy of 10 who had a total of 22 g. of sulphapyridine. The white-cell count on the eleventh day showed 12,000 white cells with polymorphonuclears 45% and lymphocytes 52%; but this may be regarded as within the bounds of normality for a child. He was also slightly cyanosed and vomited. A girl aged 4 had pyrexia of 99°–102° F. for 2 days accompanied by a morbilliform rash which persisted for 3 days. She had 11 g. of drug in all.

DISCUSSION

There appears to be a tendency to regard the sulphonamides when used in treating intestinal diseases purely as intestinal antiseptics. Hence it has been assumed that the more insoluble ones (e.g. sulphaguanidine) which could be used in such doses as to produce a high concentration in the intestine and a low concentration in the blood and tissues would be more effective in combating the disease than those which are more readily absorbed and so cannot be given in such large doses for fear of producing toxic symptoms. As we are here dealing with an infectious disease as opposed to a mere parasitic infestation of the intestine this line of reasoning may be questioned and in practice it is found that, though Buttle has shown that sulphapyridine and sulphaguanidine have equal bacteriostatic actions in vitro, better results have been obtained in vivo with the more soluble sulphapyridine.[1] Paulley's results were obtained mainly in Flexner infections. Other workers (private communication) have found this to be the case in a more decided degree in Sonne infections which are usually regarded as more resistant to chemotherapy. Particularly encouraging in this investigation is the great reduction in the time required for both clinical and bacteriological cure, particularly in the lower age-groups, and the complete absence of convalescent carriers from the chemotherapy series. It must, of course, be admitted that the numbers are small and that if it were *possible to follow up all the cases over a period of months* some carriers might be detected. The practical difficulties, however, are so great as to preclude the efficient carrying out of such a follow-up in hospital practice, but so far no return case has been admitted to the hospital. In this connexion it is interesting to note that Yannet and his colleagues[2] reported an investigation of an outbreak of 44 cases of Sonne dysentery among inmates of an institution. Of these, 27 were treated with sulphathiazole and 17 without. They report that whereas the duration of diarrhœa and pyrexia was reduced, the time needed to obtain bacteriological clearance of *B. dysenteriæ* Sonne was actually increased in the drug-treated cases. Possible explanations of this difference in findings are: that different sulphonamides were used in the two series; and that while my patients were nursed throughout their stay in hospital either in separate cells or on strict bed-isolation, Yannet's cases were not so isolated. The possibility of reinfection cannot therefore be excluded in the latter series. In a leading article in the *Lancet*[3] it is objected that the use of soluble sulphonamides in dysentery is dangerous because of the risk of deposits forming in the urinary tract of a dehydrated patient. This would not be valid in the case of Sonne dysentery where diarrhœa is usually too scanty to produce dehydration.

SUMMARY

A series of 92 cases of bacteriologically confirmed Sonn dysentery have been described.

Of these, 57 were treated with sulphapyridine and 35 were used as controls.

In the chemotherapy group the average time required to obtain bacteriological clearance was a quarter of that in the control group (5 compared with 21 days). The period required to obtain apparently normal stools in the chemotherapy group was halved (9 compared with 20 days).

No bacteriological relapses after 3 days of the negative state arose in the drug-treated cases, but in controls such relapses developed at periods ranging from 7 to days after apparent clearance.

I wish to thank Dr. W. Allen Daley, medical officer health to the London County Council, for permission publish this paper; Dr. E. H. R. Harries, medical intendent of the North Eastern Hospital, for valuable gestions; and Dr. R. Cruickshank and Mr. M. L. Maslen the pathological department for examining the very number of specimens.

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2. Yannet, H., Liebovitz, A. and Deutsch, J. V. *J. Amer. med.* 1942, 120, 184.
3. *Lancet* (Editorial) 1942, ii, 648.

Conference on Hospital Meals.—On Tuesday, July at 3 PM, Lord Horder will open this conference at the *School of Hygiene, Keppel Street, with the Minister of* in the chair. Sir Alfred Webb-Johnson, PRCS, will also and a film will be shown to illustrate the dietetic of rheumatism. Inquiries to the Food Education Society 29, Gordon Square, W.C.1.

PROPAMIDINE IN SURGICAL INFECTIONS

A CLINICAL STUDY

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Propamidine has been shown by Thrower and Valentine[1] to retain its bacteriostatic action in the presence of pus in concentrations which do not prevent phagocytosis, a property which makes it useful in the treatment of infected wounds. Accounts of such treatment have already been published by Thrower & Valentine, McIndoe & Tilley,[2] Kohn, Hall & Cross[3] and they show that the drug is effective in staphylococcal infections and is extremely potent against the hæmolytic streptococcus but is of little use against proteus and pyocyanea; in vitro against *Cl. welchii* the activity is probably of the same order as against *Staph. aureus.*

The present paper describes a further series of treated cases and suggests an additional method of using the drug. Two preparations have been employed.

1. Propamidine jelly, 0·1%, as described by Thrower and Valentine, appears to retain its activity in an infected wound for several days It is particularly useful in the treatment [illegible] cesses provided that the [illegible] e wound or inserted into [illegible] jelly may be employed with advantage after excision of a war wound or wherever complete immobilisation is required with the least possible subsequent disturbance of the infected area The technique of application is that described by Thrower and Valentine: the wound is cleaned with normal saline, the jelly applied to the entire surface of the wound with a spatula and the edge of the skin protected by a smear of soft paraffin. The wound is then covered with gauze impregnated with soft paraffin to prevent the jelly from drying. The drug is reapplied every second or third day for a total period of 10–14 days.

2. In saline solutions up to a strength of 1%, propamidine may be injected into infected serous or synovial cavities without causing local trauma or irritation. It is probable, however, that absorption into the general circulation takes place, and up to the present doses have been limited to those found safe by the intravenous route—i.e., 2 mg. per kg. of body-weight, or 10 c.cm of a 1% solution in an adult weighing 8 stone. It is possible that larger amounts could safely be used.

CASE-HISTORIES

Case 1.—A boy aged 11. Multiple wounds following explosion of a detonator. On Aug 19, 1942, he was admitted suffering from many injuries of his limbs and eyes. Eight hours after his accident he was taken to the theatre and a blood transfusion started. His left hand had been blown off above the wrist, all dead tissue including 1 in of both bones was excised. The stump was sprayed with 0 4% propamidine solution, covered with a layer of jelly and the skin loosely sutured after a vaselined gauze drain had been inserted. A shallow wound in front of the left leg was excised, covered with jelly and dressed with vaselined gauze. A deep wound which penetrated the shaft of the first metatarsal was excised and the cavity filled with jelly. Multiple wounds of the right thigh were excised and one deep one filled with jelly There was a deep wound of the right palm involving the common palmar sheath; this could not be completely excised, since fragments of foreign body were embedded in the tendons. The wound was filled with jelly, and plaster was applied Cultures: right thigh, sterile; right hand, *Cl welchii* (guinea-pig tests later showed this to be a virulent strain.)

Course.—He maintained steady improvement. He was not given any gas gangrene antitoxin. On Aug. 24 the dressings were changed. All the wounds were clean and secondary suture was possible on the deep wound of the left thigh. Active movements of the fingers were possible in the right hand. Jelly was reapplied to all wounds. Cultures amputation stump, *Staph. albus*, left leg, *B. subtilis* and pyocyanea; right hand, a few *Staph. albus*, no *Cl. welchii.* Aug. 31, wounds dressed again; the stump and thigh had healed, both wounds on the left leg were covered with discharge but underneath healthy granulations were present. Daily ultraviolet light was started. There was a little discharge from the hand, the wound was refilled with jelly, and the plaster applied again. No further propamidine was given after this.

In another month's time all his wounds had healed and he had full function in his right hand and wrist.

This was the first case in which propamidine had been used as an immediate treatment for a war casualty. Both the amputation stump and the secondary suture of the thigh healed well. It is exceptional for a hand to recover full function after a contaminated wound of the tendon sheath. The wounds of the left leg did well at first but became infected after the second dressing. The interval of 7 days between the dressings was too long and it seemed probable that it would be better in future cases to apply the jelly more often.

Case 2.—A man aged 35 Anaerobic infection of the hand. On Dec 15, 1942, he was admitted after a month's history of a "boil" on his right middle finger The top of the finger was replaced by a mass of granulation tissue discharg[illegible] offensive pus. [illegible] drainage of the [illegible] the infection slowly spread into the hand. By Jan. 27, 1943, the whole hand was swollen and smelt like rotten meat.

Operation.—A long incision was made down the middle of the hand dividing a part of the anterior annular ligament. All obviously dead tendon and fascia were excised. The resulting cavity was filled with jelly. Cultures: aerobic *Staph. aureus*; anaerobic, masses of fusiform bacilli.

The wound was refilled with propamidine every third day until Feb. 10. The infection spread no further and cultures on Feb. 8 showed only *Staph aureus*; no anaerobes could be grown. After-treatment consisted in daily ultraviolet light and physiotherapy.

By the end of April he had returned to work as a porter, he had full function in his wrist and thumb and nearly full movement in all his other fingers, except the middle one. The wounds were healed.

Anaerobic infections of the hand are generally due to human or cat bites. They tend to progress slowly but steadily, and may lead to amputation of the arm or in some cases [illegible] the infection had [illegible] the use of sulphat[illegible] claim that the drug in this case helped to preserve this man's arm. Unfortunately the pus was not cultured anaerobically before the infection had spread into the hand.

Case 3.—A man aged 40. Four weeks' infection on back of the hand after a cut with glass. On March 3, 1943, he was admitted to hospital with a typical lumbrical space infection. The space was drained in the usual manner. Culture, *Staph. aureus.* Despite drainage the discharge persisted from between the heads of the metacarpals On March 10 the cavity was filled with propamidine jelly, and on March 12 it was refilled By March 15 there was no cavity left and the discharge had almost ceased.

This infection had been unusually resistant to treatment and I think that the jelly helped considerably to accelerate healing. The tendency for propamidine jelly to promote the formation of granulation tissue is useful when treating a cavity in soft tissues of this type.

Case 4.—A boy of 15 with chronic osteomyelitis of the femur, and recurrent abscess. Admitted to an emergency hospital as a transfer after drainage of a recurrent abscess over the upper end of the femur. X rays showed chronic osteomyelitis but no sequestrum. On May 29, 1942, the plaster was removed and a soft paraffin pack taken out of a cavity about 3 in. long and 1¼ in. deep. The plaster and dressing were soaked with pus. Culture, proteus and *Staph. aureus.* T[illegible] jelly and covered w[illegible] essing was changed; [illegible] discharge On June 12 dressed again; only a shallow wound left with slight redness of surrounding skin. No further application of the drug required. The wound then healed rapidly aided by daily ultraviolet light therapy.

Propamidine did not sterilise the wound but the discharge was slight and healing rapid.

Case 5.—A man, aged 42, with recurrent osteomyelitis of femur On Oct. 17, 1942, he was admitted to the Lon[illegible] Hospital with a recurrence of infection in the shaft of [illegible] femur. X rays showed chronic osteomyel[illegible] no seq[illegible]

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1. Thrower, W. R and Valentine, F. C. O. *Lancet*, 1943, i, 133.
2. McIndoe, A H. and Tilley, A. R. *Ibid*, p. 136.
3. Kohn, F., Hall, M. H. and Cross, C. D. *Ibid*, p. 140.

trum. On admission a small abscess was drained over the outer side of the shaft. Culture, *Staph. aureus.* On Dec. 9 further drainage of pus from the same site. On Feb. 17 pocketing of infection on the inner side of the shaft and popliteal surface of the femur. A large abscess was drained. On March 4 transferred to an emergency hospital with wounds still discharging pus; X rays showed evidence of active bone infection. Clinically the man was ill with intermittent pyrexia and bone pain. On March 13 wounds dressed, thick discharge present. Culture, *Staph. aureus* and hæmolytic streptococcus. Propamidine jelly injected into all the wounds. Jelly was introduced every 3rd day for the next 14 days and then stopped. There was no local improvement while the drug was being given. After another month his temperature gradually fell to normal; the bone pain went and he is now on the road to recovery.

This case is quoted to show that propamidine cannot be expected to penetrate and sterilise infected bone.

CASE 6.—Man, aged 25, with chronic osteomyelitis of humerus; sequestrectomy. Ten years ago he had had acute osteomyelitis of the tibia. In 1941, pain and swelling of lower right arm; an abscess had formed and there had been persistent discharge ever since. In June, 1942, he attended the London Hospital with a chronic sinus over the lower end of the humerus. X rays showed a sequestrum surrounded by thickened bone. On June 15 sequestrectomy was performed. The bone cavity was laid open and filled with propamidine jelly. Culture, *Staph. aureus.* On June 21 cavity refilled with jelly. Culture as before. On June 25 refilled with jelly, cavity smaller and discharge less. On July 1 no cavity remained; no more jelly was applied. He was given ultraviolet light therapy; a month later the wound was healed. The original size of the cavity was 3 in. long by 1½ in. deep.

The cavity was rapidly filled with granulation tissue and although the cultures remained positive there was much less discharge than is commonly seen after similar operations. The wound healed more quickly than is usual.

CASE 7.—A man, aged 28, with a chronic bone abscess of tibia; 17 years before he had had acute osteomyelitis of both tibiæ. He complained of increasing pain in the lower end of the left tibia for 3 weeks. On March 15, 1943, he was admitted to hospital with the signs and X-ray appearance of a bone abscess in the lower third of the left tibia. On April 7 the abscess was opened and pus found under pressure in the centre of the bone. The cavity was 1¼ in. long by ¾ in. deep. Culture, *Staph. aureus.* The cavity was filled with jelly, and refilled every 3rd day until April 26. There had been little discharge and the remaining hole in the bone was about half its original size. After-treatment consisted in filling the cavity lightly with soft-paraffin gauze and enclosing the leg in plaster. Cultures still showed *Staph. aureus.*

Although the culture of the discharge still contained staphylococci the amount of discharge was very small as compared with that in similar untreated cases. The filling of the cavity was also quicker than is customary. Since then I have treated another almost exactly similar case with equally encouraging results.

CASE 8.—A woman, aged 51, with staphylococcal empyema. This patient was an inmate of a mental hospital. On Jan. 31, 1943, it was noted that she had a cough and temperature with signs of infection at the base of the right lung. Signs of fluid at the right base confirmed by X rays. On Feb. 1 the chest was needled and 15 oz. of pus withdrawn. Culture, *Staph. aureus.* On Feb. 16 5 oz. of pus was withdrawn and 8 c.cm. of 1% propamidine solution injected into the pleural cavity. On Feb. 18, 5 oz. of pus withdrawn and 12 c.cm. of propamidine solution injected. On Feb. 20 a little pus was aspirated and 12 c.cm. of propamidine solution injected. X rays showed much less fluid than before. On March 1, as her general condition was not improving, rib-resection was performed under a local anæsthetic and closed drainage established. The cavity contained air and a little pus. Her general condition improved and she is now well with only a small sinus remaining.

Although the empyema was not cured there were no toxic effects from the use of the drug and the treatment of further cases, at an earlier stage if possible, appears justifiable.

CASE 9.—A man, aged 50, with chronic osteomyelitis of acute bone abscess, and suppurative arthritis of knee. In December, 1941, he was transferred to an emergency hospital after drainage of an acute bone abscess in the upper end of the tibia. On Dec. 13 the plaster was removed from his leg, as his condition was not satisfactory. The knee was swollen; 50 c.cm. of thin pus were aspirated from the joint. Culture, *Staph. aureus.* A course of sulphathiazole was given orally and the joint aspirated every day. On Dec. 29, 20 c.cm. of pus was aspirated and 10 c.cm. of 0·1% propamidine solution was injected into the joint. This injection was repeated every other day until Jan. 10, 1942, when 20 c.cm. of pus was withdrawn and 10 c.cm. of 0·4% propamidine injected. This treatment was repeated five times until Jan. 23. There was then no more fluid in the joint. During this time the cultures from the pus showed *Staph. aureus*, but in decreasing numbers. The wound in the tibia was still discharging. On Feb. 25 the knee filled up again and a fresh abscess discharged from the tibia; 25 c.cm. of thick pus was aspirated and 10 c.cm. of propamidine injected.

This treatment was repeated seven times up to April 1. The amounts of propamidine were increased from 10 c.cm. to 20 c.cm. without harmful effects. At the end of this course of injections the fluid from the joint was sterile. No further aspiration was required. The knee became fixed in a good position and on discharge from hospital the man was able to walk on the affected leg without pain. He still had a sinus from the upper end of his tibia.

Suppurative arthritis as a complication to osteomyelitis in an adult is usually due to a direct spread of the bone infection into the joint. This condition is serious and generally requires open drainage of the joint or amputation. Without propamidine this man would probably have lost his leg, since the joint infection was severe. Stronger solutions of propamidine are now being used in the hope of controlling joint infections earlier.

CASE 10.—A man, aged 51, with osteomyelitis of the femur and suppurative arthritis of the knee. The same patient as case 9. For one week he had intense pain in the left leg below the knee. On March 3, 1943, he was admitted to hospital; no definite signs of infection. He was put on a course of sulphathiazole orally. His temperature remained down but the pain persisted and became localised in the thigh. On March 10 his temperature rose suddenly, there was exquisite pain over the lower third of the femur and his joint became distended with fluid.

Operation—20 c.cm. of thick pus was aspirated from the knee; 6 c.cm. of 1% propamidine solution was injected into the joint. The lower end of the femur was exposed and pus under tension found under the periosteum and in the medullary cavity. The wound was filled with propamidine jelly. Culture from the knee and femur, *Staph. aureus.* This treatment was repeated to the knee and wound 7 times until March 31. Only a few c.cm. of pus could be withdrawn from the joint at the end of this course. Treatment of the wound with jelly was stopped, since the drug cannot penetrate infected bone and it was having no clinical effect. X rays showed diffuse osteomyelitis of the lower third of the femur. On April 8 a few c.cm. of pus was withdrawn from knee and propamidine injected as before. This treatment repeated 4 times until April 21. Culture of the pus after the last aspiration showed *Staph. aureus* and a hæmolytic streptococcus. This secondary infection may have got in through the wound in the femur; at the same time a small abscess was drained over the upper end of the tibia which contained the same organisms. On May 5 there was no more fluid in the knee and no aspiration had been necessary since April 2 The wound over the tibia had nearly healed up but the was still discharging. The patient's condition steadily improved, with a normal temperature and increasing appetite

Bilateral suppurative arthritis of the knees secondar to osteomyelitis must be rare in an adult of this age. arthritis responded quickly to the 1% propamidine an despite infection of both bones open drainage avoided though the patient will undoubtedly be left wit two stiff knees. It is quite possible that without pr pamidine he might have lost both his legs.

DISCUSSION

The jelly base of the propamidine preparation u is a tissue irritant and must not be used if the wound to be sutured. Round open wounds it may cause redn of the skin which should be protected by soft paraffi If the drug is used for more than 10 days the producti of granulation tissue is often stimulated to an exte which is undesirable in superficial lesions but useful in filling up deep cavities. For superficial infections a 'Lanette wax' preparation of the drug might be employed such as that described by Morley and Bentley[4] in the treatment of infected burns.

In the cases reported the jelly was effective provided that the whole surface of the wound could be treated. The wounds rarely became sterile while under treatment but their rate of healing seemed to be hastened.

Propamidine jelly does not penetrate soft tissues or bone and is essentially a local bacteriostatic.

Unfortunately only one case corresponding to a freshly excised war wound has been treated but it seems that this preparation should be a valuable dressing for wounds after excision when the patient is to be transferred to a base hospital, since the concentration of the drug is maintained by the jelly base for some days, unless oozing from the wound is excessive.

Propamidine solution has mainly been used against staphylococcal infections. The results on the two cases of joint infection were encouraging, since staphylococcal arthritis in adults generally requires open drainage or amputation, especially if complicated by a neighbouring osteomyelitis. The effect of the solution on one case of empyema was not outstanding but calls for further investigation on similar cases. The treatment of empyema due to infection by other organisms, especially the hæmolytic streptococcus, would be of great interest.

SUMMARY

The bacteriostatic action of propamidine is briefly described and two methods of local application, as a jelly or in solution, are given in detail.

Of 10 cases reported, 7 illustrate the value of propamidine jelly in the treatment of recent war wounds, infected hands and certain types of bone infection; 3 show that a 1% solution of propamidine injected into infected joint or empyema cavities may help to overcome the infection and sometimes make surgical interference unnecessary.

The properties of propamidine jelly are discussed with special reference to its use in the treatment of war wounds. The danger of using the jelly if the wound is to be sutured is emphasised.

I should like to thank Dr. W. R. Thrower for his help and enthusiasm, and Messrs. May and Baker Ltd. for kindly supplying the propamidine Dr. F. C O. Valentine was responsible for the bacteriology of the cases described and without his help these reports would have been valueless.

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4. Morley, G. H. and Bentley, J. P. *Ibid*, p. 138.

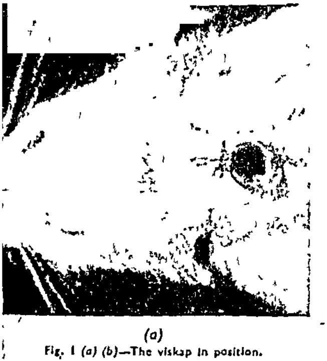
A METHOD OF PRODUCING XPERIMENTAL GRANULATING WOUNDS *

H. E. HUTCHISON, M B GLASG
JOR RAMC; LECTURER IN CLINICAL PATHOLOGY AT THE UNIVERSITY OF ST ANDREWS

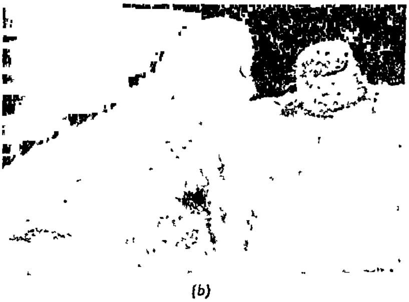
(*From the Pathology Department of the University*)

It is desirable to have a simple procedure for making : wounds. After much was devised to produce : would not be readily ot dry with the formaon of an impenetrable surface scab; and could be ispected without the risk of damage by the removal of rotective dressings. This experimental wound has the dvantage of being cup-shaped and is thus adapted to tain substances applied to its surface. The simplicity nd reliability of the method have been established in everal thousand experiments.

Rats weighing 200–250 g. were used but similar ounds may be made in guineapigs, rabbits, &c. With he animal under ether anæsthesia a suitable area on the ack of the neck is epilated by plucking the hair. The kin is cleansed with 'Dettol' or 'Lysantol' followed y spirit, and an ellipse of skin about 1 cm. in the long xis is removed by scissors curved on the flat. The uperficial muscle is then split longitudinally in the midine and the underlying paired muscles separated. If ecessary, bleeding is controlled by a pledget of cottonvool moistened with liquor adrenalinæ hydrochloridi. he skin and superficial muscles are sutured anteriorly while at the posterior end of the wound a similarly placed suture is passed but not tied. A prepared 'Viskap'[1] is then inserted, the untied suture being used to draw the skin and muscle closely round the neck of the viskap where they are then tied (fig. 1). Packing the viskap with cotton-wool helps to maintain its shape in the tissues. The viskap usually becomes fixed to the margins of the wound by dried serous exudate, and care has to be taken with this subsequently.



(a)



(b)

Fig. 1 (a) (b)—The viskap in position.

When the wound has reached the desired age the animal is anæsthetised with 'Nembutal' or ether and the viskap is packed with moist cotton-wool, a further piece of which is also wrapped closely round the portion protruding from the tissues. This softens the structure and also the dried serous exudate binding it to the wound margins, so that at the end of half an hour it can be folded and withdrawn gently leaving a moist undamaged granulation tissue lining around a cupshaped wound (fig. 2).

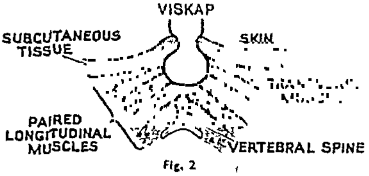


Fig. 2

PREPARATION OF VISKAPS

Viskaps are generally familiar from their extensive use as occlusive seals on bottles. Applied in a moist and pliable condition they form a firm seal when dry. Size 000 was found suitable for rats, larger sizes (00 or 0) for guineapigs. After thorough washing overnight in running water to free them from the 1% formalin in which they are stored they are allowed to become nearly dry and are then inspected; those showing small per-

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* Work done with the support of the Medical Research Council which furnished, through Prof D F Cappell, a personal and also an expenses grant

1 Obtainable from Viscose Development Company, Woldham Road, Bromley, Kent

forations are rejected. Next 'Plasticine' is packed in tightly and a thin wire loop drawn round within ¼ in. of the open end so as to produce a constriction. When dry the wire is removed and the viskap is found to retain its new shape. Most of the plasticine can then be picked out and the remainder is removed by shaking the capsules in petroleum ether. The viskaps are then stored in spirit ready for use.

With this method the behaviour of wounds of any age up to 10 days can be followed easily. The viskap lies deeply in the tissues in the natural hollow between the occiput and the scapulæ and the animal cannot reach the wound with its teeth. Hence loss due to interference is reduced to a minimum. As healing proceeds the growth of granulation tissue tends to force the viskap out and the wound becomes useless for further observation; thus allowance has to be made for a considerable loss in order to obtain wounds 7–10 days old.

Where it is desired to study the effect on the tissues of soluble substances capable of diffusing through the 'Viscose' membrane the viskap is left in situ and is filled with the test substance together with a pledget of cotton-wool which helps to retain the fluid. Repeated applications can thus be made with a minimum of mechanical damage to the surface of the wound, and contact with the tissues may be maintained over a period of days. This method has proved of great service in investigating the effects of various antiseptics upon wound surfaces, and reproducible results are readily obtained.

Reviews of Books

Examination of Water and Water Supplies

(5th ed.) E. V. SUCKLING, MB LOND., DPH. (Churchill. Pp. 849. 60s.)

WATER, on the authority of the OED, is the liquid of which seas, lakes and rivers are composed, and which falls as rain and issues from springs. Dr. Suckling limits his survey to definition Id, water as supplied for domestic needs, especially as distributed through pipes to the houses of a district—not so modern a conception after all, as it has 300 years of history behind it, although it is almost within our time that "water laid on" has become the hall-mark of civilised existence. This piping business has its conveniences, but like the pooling of milk it also has its drawbacks, and we are suffering less and less from more and more of the pollutions due to human aggregation and industrial processes. The germs of sewage for instance, Dr. Suckling tells us, survive longer in pure pipe water than they do in their own dirty surroundings, so that our very precautions have their dangers. But there is no help for it now. The safe underground sources of supply are inadequate for the needs of a growing population, even if content with one bath weekly, and water engineers must go on purifying polluted water and water examiners must devise foolproof methods of checking the purification. Dr. Suckling's new edition is not just a compendium of methods for his fellow analysts, it is a book to be read from cover to cover by all who have to deal with pipe water.

Chemical and physical methods are becoming very precise. H-ion concentration, measured to check coagulation and softening processes, is recorded electrically and so is the automatic control of the dosage of chemicals. The photo-electric cell measures turbidity by recording the amount of light transmitted through the water. Discovery of significant amounts of fluorine in the tertiary beds below the London clay has added a new interest to chemical examination; addition of tri-calcium phosphate seems to be regarded as the best way of removing excessive fluoride (boiling is ineffective), but such water may have to be replaced. The risk of dissolving lead from service pipes does not seem to be confined to the soft peaty water of the uplands. On the bacteriological side mere enumeration of colonies, although useful as a rough test of the efficiency of purification, is no sufficient guide to the purity of the water. Classification of the coli-aerogenes group still gives the water examiner much anxiety.

But the big essentials stand out in this book in their right proportion. Chlorination ranks with boiling as the ultimate safeguard against the spread of water-borne disease, and the section on chlorine has been rewritten to include what has been learned in the last decade. A great book, large in vision and execution as well as in size (and price).

Fractures and Fracture Treatment in Practice

KURT COLSEN, MD, tutor to the department of surgery, Johannesburg. (University Press. Pp. 147. 12s. 6d.)

THIS book, based on lectures given to students of Witwatersrand University, describes concisely the essentials of modern fracture treatment. Drawing largely on the practice of Böhler and Watson-Jones, Dr. Colson makes no claim that it contains a full account of modern fracture therapy, but offers it to undergraduates for whom the standard works are too extensive. The methods advocated, essentially conservative, are well described and appliances are successfully illustrated by pen and ink sketches. Most of the methods taught would be accepted by any examiner, but the insistence on abduction treatment for all fractures of the humeral neck, and the statement that in medial epicondyle fractures with displacement into the joint "operation should be considered," might give rise to criticism. Lane's plates and similar methods of fixation are condemned, though they have given good results in selected cases; in a student's book, however, forthright statements may well be justified.

First Aid

(45th ed.) HALLIDAY SUTHERLAND, MD EDIN. (Livingstone. Pp. 76. 9d.)

THIS little first-aid vade-mecum is designed for the waistcoat pocket—it measures 4 in. by 2¾. It is a revision of a book first published by the author's father in 1887, and the evidence of its 45 editions is proof that it has been found really useful. It compresses a large amount of information including much anatomical detail into a small compass and should be an excellent memory aid to the trained first-aider. The style is clear and the illustrations are well drawn. We do not, however, approve of the advice on page 25 to plug the nose in epistaxis.

Electrocardiograms

An Elementary Atlas for Students and Practitioners. (2nd ed.) H. WALLACE JONES, MD LPOOL; E. NOBLE CHAMBERLAIN, MD LPOOL. (Wright. Pp. 56. 5s.)

THIS small book illustrates the types of cardiogram which the practitioner or student are likely to meet in their daily work. The 53 figures are of good technical quality for their purpose, although there is in some a little fogging or unsteadiness of the base line. The interpretations are always helpful and might with advantage be a little fuller.

Soviet Science

J. G. CROWTHER. (Penguin Books. Pp. 178. 9d.)

THIS book is an abridgment of another first published in 1936, so that it does not purport to give the latest information about scientific research in Russia. Nevertheless it gives the reader an insight into the directi which Soviet research was taking and an explanati of the remarkable resistance of the Red Army and o Soviet industry to the German invasion. Little space is allotted to medical subjects but the description of work being done on other subjects is so clear and concise that it cannot fail to interest anyone with a scientific education. The first few pages give probably the account of dialectical materialism available to th ordinary reader. The catalogue of scientific work progress in the Soviet Union is impressive and sh what important contributions Russian scientists a making to contemporary science. Mr. Crowther po out that freedom of research is much greater in th Soviet Union than in so-called capitalist countr because research workers are not employed by partic firms to make advances by which those firms alone ma benefit; instead, any new discovery becomes comm property.

THE LANCET

LONDON: SATURDAY, JULY 17, 1943

SIGNS AND SHADOWS

PHYSIOLOGISTS justly insist that a man must know the normal before he can form a judgment on the abnormal. Dr. A. E. [illegible] the annual meeting of the [illegible] on July 2, suggested that i[illegible] temptations to ignore this principle have been particularly strong; for clinicians were quick to perceive the potential value of X rays in diagnosis, and radiologists were called on to use the method on the sick, before systematic study of healthy subjects had provided the necessary base line. Between the enthusiastic and the not so scrupulous, some imaginative diagnoses followed. The début of the opaque meal revived a dying belief in enteroptosis (Glénard's disease); for the picture shown by X rays was not that of the dissecting-room, and no-one stopped to ask whether the lively gut behaved otherwise than its pickled counterpart. Fortunately there was no radiological way of detecting a movable kidney at the time. Then the theory of intestinal stasis took hold of professional, and next of lay, imagination; and though the radiologists had no adequate control experience on which to found an opinion they were asked to say whether there was delay in this or that part of the alimentary tract. Some plunged blindly; and those who hung back from oracular pronouncements were less popular. On the strength of radiological reports the abdominal contents were subjected to such slingings-up and tyings-down, such resections and excisions, as left many patients chronically invalided and hastened the death of others. Yet some radiologists, even in those days, were trying to establish the limits of the normal, even though their research had to be carried on in the intervals of routine work, and on patients and such normal subjects as would collaborate with them. They had the warm support of leaders in surgery and medicine, for at one important conference 15 years ago WALTON described the X-ray film as a single photograph of a cinema performance and HORDER epitomised visceroptosis as unhealthy functioning not faulty position, pleading for the "utmost forbearance" in the reading of radiograms. BARCLAY himself has seen on the screen a normal stomach drop four inches at the banging of a door or the onset of nausea.

The chest offered even greater opportunities for misdiagnosis than the abdomen and unfortunately still does. In the lay and legal minds X-ray findings have been given a quite spurious importance in some cases. Primarily this is due no doubt, as LANGDON BROWN said in a Skinner lecture, to the "failures and delays of the unaided clinical method." In silicosis, for example, a man cannot claim compensation for the disease (though he may die of it, as autopsy proves) unless his radiogram shows typical shadows. BARCLAY reminds us that X rays of the lungs show only the end-result—fibrosis. They do not show, or else we do not yet recognise, the changes responsible for symptoms. This is an important distinction, for with improving equipment and technique more of the lung structure is revealed every year; smaller opacities can be detected, slighter differences in radiopacity can be gauged, and the better the film the more intricate the pattern it reveals. A shadow, he says, is nothing in itself—it is merely the image of some object recognisable only through knowledge of its own characteristics: its shape, position and opacity. Every shadow may, indeed must, have a meaning, for, as POPE tells us in a well-worn couplet, a shadow (like envy) proves the substance true. But it does not reveal the substance in perspective, optical or logical, and (HORDER again) there is no difference in essential value between facts elicited by instrumentation and by clinical investigation; the only difference is in degree of the facts, their interpretation and their relation to other facts. Perspective is gained by the parallelism of signs, symptoms and shadows.

None of this is likely to depress the faculty to whom it was addressed, for it was the chastening of an old and accepted friend who regards radiology as an essential, perhaps the essential, accessory service, without which a high standard of medicine or surgery is unobtainable —bringing as it does to functional pathology the help which the discovery of the microscope brought to morbid anatomy. That is the goal; but, BARCLAY asks, are radiologists content to go on finding their way to it by years of trial and error when they can arrive at the truth with little delay by the application of scientific method and proper control? Something is now taught of X-ray findings in the anatomy curriculum; but schools of anatomy and physiology do not maintain their own X-ray plants for the study of the nor[illegible] fallen behind in [illegible] which study of the abnormal can proceed. The advent of mass radiography has intensified out of all measure the need for criteria of normality without which many people may be called tuberculous when they are in perfect health. He would like to see a radiological research unit devoting itself to the study of the body in health—a study which might well be made, he thinks, on the vigorous bodies of university students. As he envisages such a unit it would have the outlook of an academic laboratory but its energies would be directed by a clinician to problems which daily confront the radiologist in his department. Many of the problems raised could only be solved by close touch with departments of anatomy, physiology and pathology; and at the laboratory the radiologist could count on unbiased criticism and scientific help. It seems a pity that the conception was not realised when it was suggested a quarter of a century ago at the time the Cambridge diploma was under discussion.

TREATMENT OF BACILLARY DYSENTERY

WHILE full data are not yet available about bacillary dysentery in the Forces in the Middle East, clinical observers agree that its incidence has been limited and its nature not severe. The absence of widespread epidemics like those that decimated the ranks in the 1914–18 war must be largely due to improvement in the hygiene and feeding of the troops, together with a high standard of field sanitation and effective instruction by the medical officers. The lessened severity of the infection is partly a reflex of the good health of the men and the rarity current debilitating disease, and partly a consequence of the low incidence of Shiga infections: 10–20% compared with 50–60% in the last war. The comparative mildness of the infection has, however, increased the difficulties of clinical diagnosis. It will be seen that in our present issue BULMER and PRIEST, in a review of over 4000 cases of diarrhœa in the Middle East, classify 56% as acute catarrhal enteritis (familiarly known as "gyppy tummy"), and seem to assume that these cases of diarrhœa without blood and mucus are due to infection with one or other of the dysentery bacilli; BENSTED and PERRY[1] demonstrated the presence of dysentery organisms in a large series of similar cases, so this assumption is probably justified. But now that desoxycholate-citrate agar is generally available for the laboratory diagnosis of dysentery—in Army circles abroad there was at first some difficulty in getting it—a better classification of these mild infections should be possible. To illustrate the complexity of the bacterial ætiology, we may note that 70% of BULMER and PRIEST'S cases of clinical dysentery which yielded positive cultures were due to the Flexner group of organisms, 19% to Shiga and 6% each to Sonne and Schmitz; while from Australia comes a report[2] of an epidemic of dysentery due to one of the non-Flexner types P. 274 which BOYD[3] isolated in India.

The treatment of clinical dysentery with sulphaguanidine is now an established procedure. No doubt many cases would do well enough with symptomatic treatment—BULMER and PRIEST recommend a bland diet with plentiful fluids in place of the older purgative treatment—but the accumulated evidence shows that the use of sulphaguanidine results in rapid improvement in the patient's condition and a much shorter stay in hospital. Even the mild diarrhœal cases apparently respond. Dosage in the Army is apt to be high, with a total of 100 grammes or more per case; smaller amounts, 6 g. initially, followed by 3 g. t.i.d. for three days and 3 g. b.d. for another four days, would suffice for most patients. It must be borne in mind, however, that large doses are needed for Shiga infections.[4] Treatment should begin as early as possible, without waiting for bacteriological confirmation, and enough fluid must be given to ensure a urinary excretion of more than 1000 c.cm. per diem. Toxic effects are rare. The rapid clinical response to sulphaguanidine is very gratifying when we recall the protracted convalescence of the pre-sulphonamide era, often with relapse and the risk of chronic dysentery. Army regulations require that bacteriological cure should be proved by 2 or 3 consecutive negative rectal swabs on desoxycholate-citrate agar, and civilian clinicians, too, should keep this criterion in mind. If clinical cure is important for the welfare of the individual, bacteriological cure is equally important for the welfare of the semi-isolated community to which he belongs; and it is folly to return a convalescent dysentery carrier to his unit where he may have ample opportunity to initiate fresh cases. This epidemiological aspect of the problem must not be disregarded where considerable troop movements with chances of spread from infected to unsalted units may mean, as it did in the last war, large outbreaks of dysentery in areas formerly free from infection. Fortunately sulphaguanidine may be expected to effect bacteriological as well as clinical cure in the prevalent Flexner infection; so if the drug is used routinely in *all* cases of diarrhœa, whether clinically dysentery or not, the danger from convalescent carriers will be correspondingly reduced.

At home dysentery is now endemic in many parts of the country. It is usually due to the Sonne bacillus, and although this organism is occasionally lethal to the young or to the very old and debilitated it ordinarily produces only a mild diarrhœa which is in no way characteristic. Nevertheless Sonne dysentery is a troublesome disease of high infectivity, and the convalescent carrier does much to spread it. After both Flexner and Sonne dysentery, convalescent carriers are much commoner than used to be thought; in the more severe Flexner infections persistent excretion of the organism may be associated with ulcers in the large bowel detectable only by sigmoidoscopy[5]; but in the mild Sonne infections there is little likelihood of mucosal ulceration, and bacteriological control of all convalescent cases seems therefore to be the only reliable means of recognising the carrier state. Excretion may be intermittent, especially if the well-known tendency to constipation after dysentery is not prevented.

Sulphaguanidine has not proved its worth in the cure of the Sonne carrier. On p. 71 SWYER reports good results in the clinical and bacteriological cure of children with sulphapyridine, which can be used with safety and without much gastric upset for young patients with mild infections and little dehydration. In the more severe adult infections, however, if sulphaguanidine is not available, sulphamethazine, becaus of its greater solubility and less toxicity, appears t be the preferable alternative. No results have ye been published on the use of succinyl sulphathiazol (sulphasuxidine) in dysentery but personal communications suggest that it is promising and may ev excel sulphaguanidine. This preparation apparentl acts by the liberation of sulphathiazole, which i perhaps the most potent of the sulphonamides; an as only 5% of the drug is absorbed from the bow it might be expected to be even better and safer tha sulphaguanidine in the treatment of bowel infection

HOW SAFE MILK?

As things now stand, people in some areas no long have *free choice of dairyman; for distribution* h been rationalised so that only one or two retaile may deliver in each street. Such people mu accept the kind of milk their dairyman offers, an some of those who once took care to protect th families by buying pasteurised or tuberculin-te (TT) milk are now served with raw undesignated m whether they like it or not. In their new wh paper[6] the Government point out that in areas wh the national interest prevents a consumer choos his supplier, they feel themselves under an obligat to ensure as soon as possible that all milk sup "should conform to the higher standards of pu

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1. Perry, H. M. and Bensted, H. J. *Trans. R. Soc. trop. Med. Hyg.* 1929, **22**, 511.
2. Rothstadt, L. E., Fenner, F. and Baker, B. A. *Med. J. Austral.* April 17, 1943, p. 341.
3. Boyd, J. S. K. *J. Hyg., Camb.* 1938, **38**, 477.
   Fairley, N. H. and Boyd, J. S. K. *Trans. R. Soc. trop. Med. Hyg.* 1943, **36**, 253.
5. West, R. F. *Med. J. Austral.* April 17, p. 344.
6. Measures to Improve the Quality of the Nation's Milk Su Cmd. 6454. HMSO. 2*d*.

which have previously been demanded." To this end they propose that the Minister of Food shall be empowered to schedule areas in which it will be an offence to retail any milk except heat-treated (pasteurised or sterilised) milk, TT milk, or accredited milk from a single accredited herd. The Government also "attach the highest importance" to the quality of milk supplied under the milk-in-schools scheme. They therefore intend to make a census of schools to show what type of milk is now consumed, and will then make every effort, in consultation with the local MOH, to provide all schools with milk of one of the three grades mentioned above.

It will be evident from this, and from the Food Minister's statement which is reported on p. 85, that the Government have not been won over to the view that all milk must be heat-treated to make it safe: their policy is still in the main a long-term policy of increasing the cleanliness of supplies. In this endeavour they pin their faith first to sound breeding, which will reduce the animal's susceptibility to disease; secondly to more efficient inspection of herds; and thirdly to measures that will encourage farmers to set their cow-houses in order and produce more milk of the highest quality—that is to say, TT milk. As early as may be, the Minister of Agriculture is to take over (in England and Wales) all the functions of local authorities relating to the inspection of cattle and the conditions under which milk, whether designated or otherwise, is produced on the farm. At present, owing to the shortage of veterinary staff, many herds that do not produce designated milk are never inspected at all; in future special attention will be paid to herds whose milk is sold without heating, and these will be inspected twice a year, or oftener if they have a bad history of disease. Producers of TT milk (which now amounts to about 6% of the whole) will get a premium of 4*d*. a gallon whether their milk is sold as TT milk or not, and the price of TT milk to the public will be only a little more than the price of other milk. Though the inspection of cows and dairies will be transferred to the state, local authorities will still be responsible for the protection of milk against contamination or infection in depots and retail premises, and during transport and distribution. Moreover, where the Minister of Food wants to forbid the sale of raw undesignated milk in a given area, but the trade itself is unable to arrange for the necessary treatment by heat, the local authority will be enabled to instal and operate pasteurising plant, acting in this respect as a milk wholesaler.

The basic difficulty of framing a milk policy is to make sure that milk is safe without stultifying the effort to make it clean. Heat will make it safe, but if every drop is to be pasteurised—still more if it is to be boiled—very few farmers are going to devote themselves to producing a really clean milk which can safely be drunk raw. It is true that there is always some risk in drinking raw milk, however carefully it is produced: though the risk of contracting tuberculosis from TT milk is slight, there is no guarantee that it does not contain the organisms of undulant fever, to say nothing of accidental contaminants; and it should not be given to young children without heating. Nevertheless we have always thought it wise to stimulate the clean-milk movement by allowing and encouraging the sale of TT milk; the advantages in the long run will outweigh the disadvantages. Where our view differs from that of the white-paper is that we hold that the sale of any raw milk other than TT milk should as soon as possible be forbidden. Nothing except the highest grade of designated milk should be sold without heat treatment, and though the Government's programme, energetically fulfilled, would mean a great advance towards safety, we are not persuaded of the value of allowing the sale of raw milk from "accredited herds" which have not passed a tuberculin test. Particularly distressing during the past few years has been the fact that school-children have been officially supplied with milk which carries no guarantee of freedom from tubercle bacilli; and while we welcome the Government's concern at this obnoxious feature of the milk-in-schools scheme, we are sorry to see that they still contemplate the occasional provision in schools of a grade of milk which is neither tuberculin-tested nor made safe by heat.

Annotations

ARNOLD KLEBS

NEWS has been received of the death on March 6 in Switzerland of Dr. Arnold Carl Klebs, leading authority on the medical history and bibliography of the renaissance. He was born at Berne to a Swiss mother, Rose Grossenbacher, when his father, Edwin Klebs, was examining gunshot wounds in the Franco-Prussian war and inspiring Robert Koch's study of traumatic infection. The son was 3 years old when Edwin Klebs first produced *Perlsucht* in animals, he was 8 when his father first inoculated the contagion of syphilis, and 13 when he was the first to see and recognise the cause of diphtheria. His home was now at one university town and now at another, and half Prussian, half Swiss, by birth he was schooled at Prague, graduated at Zurich, and studied in Germany, Paris, and London before following his father to America. Imbued with the same restless activity, inherited from Slav forbears, Arnold Klebs became a leader in the group of American physicians attacking the problems of tuberculosis, was director of the Tuberculosis Institute of Chicago and edited (in 1909) an American symposium on *Tuberculosis*, which was a minor landmark. Then at the age of 40, though a naturalised American with an American wife, he returned to his native Switzerland and devoted himself to the history of medicine. All his work was based on thorough scientific knowledge of the printed sources of whatever subject he had in hand. His first large-scale work was a history of variolation, the forerunner of vaccination, but he soon restricted his interest to renaissance medicine and became the acknowledged authority on medical incunabula—books printed before 1500—and their immediate successors. Under the inspiration of William Osler he set out to combine his own skill in the medical content of these books with the technical study of the early printers and their methods, which had been the preserve of librarians. His real love for old books and woodcuts and his wide knowledge of Europe enabled him to play with consummate skill the detective game of dating and attributing the rare anonymous tracts of his chosen period. He was equally at home with the masters—Leonardo, Fracastoro, Vesalius. His identification of the serial landscape which appears in the plates of the *Fabrica* is one striking instance of his cultivated insight. His advice was always at the service of his friend Harvey Cushing when he was collecting the richest library of renaissance medical books ever got together by a private collector. Cushing bequeathed his library to Yale, where after the war Klebs's own books will join it. Masterly studies of herbals and plague-books were steps towards the ideal catalogue which now we shall never see. In 1937 however Klebs published a short title list of all known editions of scientific incunabula ("3000 and a few more"), the fruit of thirty years' intensive study and an irreplaceable tool for his followers. In a preface of characteristically veiled incisiveness he acknowledges the friendship and help of an American, Fielding Garrison, a German, Karl Sudhoff, a Frenchman, Louis Polain, and "the most perfect technical aid" of an Englishman, Mr. Victor Scholderer of the British Museum. Klebs was often in London, where he enjoyed the friendship of D'Arcy Power, who contributed to the book of essays dedicated to Klebs in 1940. He was last here in April 1939 on his way home from a one-day hop to America for Cushing's 70th birthday party.

CARCINOGENIC ACTION AT A DISTANCE

An important aspect of experimental carcinogenesis with chemical compounds is the unexpected appearance of tumours at a distance from the point of application. Explanations are probably to be found in the path the chemical takes once it is absorbed into the body and in the relative cell sensitivity of tissues it encounters on the way. The chemical constitution of the compound may also undergo some essential change during this passage. An example of the phenomenon of action at a distance is recorded in the report for 1942–43 of the Yorkshire Council of the British Empire Cancer Campaign. J. W. Orr has found that, in mice of known pedigree which have never previously borne mammary tumours, intranasal treatment with methylcholanthrene led to the appearance of mammary tumours in two-thirds of the mice at risk and these appeared earlier than skin tumours. A similar result due to skin painting with methylcholanthrene was obtained earlier by Maisin and Coolen.[1] Another familiar example is the production of bladder tumours in dogs by β-naphthylamine when given by mouth. The importance of these and many similar observations lies in directing attention to possible distant and indirect causes of cancer. The reason for the rise in recent years in lung cancer has been sought chiefly among substances likely to be inhaled, and no entirely satisfactory explanation of all the facts has been found. Here also the cause may be acting from a distance. In the Yorkshire report failure of a substance to act except directly was found by H. N. Green when pellets of acetylaminofluorene implanted under the skin caused no tumours to develop in the liver. Carcinogens applied by H. E. Harding over long periods directly to the mucosa of the cat's stomach, jejunum and colon failed to produce tumours or to alter the characters of the cells, though either effect might have been expected.

INJURED BUT ABLE

The Central Council for the Care of Cripples have published a memorandum criticising the Tomlinson report[2] on the rehabilitation and resettlement of disabled persons. In many respects, they feel, the report is worthy and constructive, but they take exception to the three proposals: that employers should be required to take a quota of disabled people; that certain occupations should be scheduled for the benefit of the disabled; and that a register of people handicapped by disablement should be drawn up. They feel the register and the schedule would focus attention on the disability rather than the man; for as they state:

> "It is a common error to suppose that the most important thing about the man with an amputated limb is that he has an amputated limb, whereas on a proper view of the case the most important thing is that he is still a man, and still has three intact limbs, together with a brain and other valuable faculties, all in good condition (if he has been properly treated while in hospital) and even his amputated limb has been so well fitted with an appliance (in the use of which he has been so well taught) that its functions are largely restored. Thanks to these remaining qualities, and to the facts of applied physiology, his working capacity may be little, if at all, impaired. If he is to be 'registered' at all, then it is misleading to take account only of the anatomical defect."

If any register is to be compiled, the council consider that it should be one of employers who have tak the trouble to study the industrial efficiency various kinds of handicapped workers. The schedu of occupations might have the effect of fixing the targ of the disabled, and preventing them from trying achieve full working capacity. The council agr that those who cannot stay the course of a f working week may need sheltered conditions li those to be found at Papworth and in various epilep colonies; but in the main they feel that the injured m should be encouraged to take his ordinary place industry, quoting the finding of Ford that "there a more places in industry that can be filled by cripp than there are cripples." They suggest that the sta might give a lead by relaxing the present stringe health requirements for civil servants.

The council's own solution for the problems of habilitation is embodied in the conclusions of the mem They would like to see: an educational campaign amo doctors, nurses, masseurs, physiotherapists, employe and legislators in the principles of adaptation of medici to industry so that they will understand what faculti are needed for different kinds of work; a better adviso service for disabled people; and abolition of the prese Workmen's Compensation Act in favour of a compr hensive health service.

SULPHONAMIDE THERAPY FOR THE FŒTUS

When sulphanilamide is administered by any of t usual routes to a pregnant woman, it is distributed more or less equal concentration throughout the who body including the fœtus and the amniotic fluid. Oth sulphonamides (sulphapyridine, sulphathiazole, sulph diazine, sulphacetamide, but not azo-dyestuffs like r prontosil) behave in the same way,[1,2] and the concentr tion in the blood of the fœtus approximates to that of t mother. The concentration in the amniotic fluid depen on that in the fœtal urine, which often contains a lot the drug, and consequently it may be higher than in t maternal blood. This ready passage across the placen opens up the possibility of administering sulphonamid to the fœtus. Speert[2] administered a single 5 g. dose sulphathiazole or sulphadiazine by mouth to women labour and found that under these circumstances absor tion was poor, the blood concentrations in both moth and fœtus being very low. He then gave a single intr venous 5 g. dose of sodium sulphathiazole or sulphadi zine. Considerable amounts appeared in the fœtal bloo within 15–30 minutes, and concentrations of 5–7 m sulphathiazole per 100 c.cm. fœtal blood (5–20 mg. maternal blood), or of 9–11 mg. sulphadiazine per 1 c.cm. fœtal blood (10–20 mg. in maternal blood) we maintained during the next few hours. The fœtal bloo level went higher and was sustained longer after sulph diazine than after sulphathiazole, so that sodium sulph diazine seems the preferable compound for this purpos The fœtal indications suggested by Speert for this pr cedure are, first, cases of prolonged labour with rupture membranes, in order to prevent bacterial invasion of th fœtal vessels; and secondly, cases in which gonococc infection of the mother is suspected, in order to prote the fœtus against intrapartum infection. The chances benefit to the fœtus must be weighed against the chanc of toxic effects on the mother and child. As regards the mother the position is similar to that in any major surgical operation, and there is a slight risk of renal obstruction following the intravenous administration of large doses of sulphonamides during a period of depressed renal function As regards the child, evidence is somewhat scanty. Large doses of sulphanilamide given over long periods to pregnant rats and rabbits lead to increased intra-uterine and postnatal mortality and to stunting of the offspring[3]; and Philipp[4] reports that out of 15 women receiving sulphonamides during pregnancy, one who had taken 112 g. during the 5th and 6th months gave birth to a dead fœtus. Sulphonamides should therefore be given to pregnant women with circumspection, but moderate short courses can be given safely, and with the single intravenous dose proposed by Speert such drastic effects would not be expected. In the 18 cases treated by Speert, and in 35 reported by Kayser the children appeared completely unharmed, On the other hand, Heckel[5] records 13 mothers taking sulphanilamide, and in one case—the one receiving the lowest dosage—the baby suffered from severe anæmia and jaundice which may have been due to the treatment. A properly planned investigation of the subject at some large maternity clinic would be valuable. If a series of patients with the indications mentioned by Speert was observed, and alternate cases were given a single intravenous injection of sodium sulphadiazine, possibly using a dose smaller than 5 g, reliable evidence for or against the procedure ought eventually to be forthcoming

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[1] Maisin, J. and Coolen, M. L. *C.R. Soc. biol. Paris*, 1936, 123, 159.
[2] See *Lancet*, 1943, i, 113 and 119.

[1] Kayser, H. W. *Klin. Wschr.* 1911, 20, 510.
[2] Speert, H. *Amer. J. Obstet. Gynec.* 1943, 45, 200.

RAF WOMEN X-RAYED

Clive[6] has brought up Trail's[7] figure of mass radiography of WAAF recruits from 10,000 to 30,000 and has compared the results with 30,000 men of similar ages The total incidence of pulmonary tubercle among the women was 238=0·79%, against 0·58% in the men, higher that is by about 4 to 3 but still ranking low in Banszky's[8] comprehensive series, except for the RN. Clive however notes that the cases were not strictly selective, as the women had all been passed for tional service They had all done their physical ining without demur and regarded themselves as for full duty Nevertheless 102 had findings typical active tubercle, twice as many as men in the under 's. An outstanding feature of the inactive tubercle and was its rapidly increasing incidence with age, ong the over 35's it was 13 times more common in en and 8 times more common in women than among e under 20's—an example, Clive remarks, of the lf limiting nature of the disease (long recognised by thopædists) Analysing the 102 cases of active sease, in no less than 64 no significant history of any nd was elicited, 16 already had cavitation on one le and 4 on both, while 4 were at the earliest stage with pical Assmann's foci. Physical signs could only be tected in 66 of the 102 in other words the miniature m was detecting 50% more active cases than did per ssion and auscultation. Half the active cases had sputum at all, women tend to conceal it, Clive plains. Seventeen were subfebrile, the rise of tem- erature yielding to a week in bed, 12 had clubbed gers, in 3 of whom it was the only sign. Of non- berculous conditions 0 cases of pneumonia and 4 of onchopneumonia were brought to light, no symptom her than 'bad cold" being admitted Many of the omen with the same symptom had transient shadows the middle and lower zones of the lung, called "catar- al shadows" by Clive and attributed to atelectasis, ut which might well have come into the category of so called primary atypical pneumonia (or indeed of the "patch of congestion" of everyday practice) Among abnormalities a surprising number of cervical ribs were discovered. 5 in every thousand, all symptomless Clive concludes that 4 per 1000 of the women examined were in need of immediate institutional treatment, and one of these of some form of relaxation therapy. Some 6 per 1000 would require re examination at intervals. The combined surveys of Trail and Clive give an enlightening presage of what a general radiological survey of the youthful population of this country may reveal

CARE OF THE PREMATURE INFANT

THOUGH she concludes her article with the remark: "The premature infant has been sadly neglected" (p 82), Elaine Field is able to record that, even under war conditions and despite unsatisfactory accommodation, a low mortality rate can be achieved among such children An unusually high standard of nursing seems to have been available for her cases, and this confirms what the pædiatricians in this country, inspired by the achievements of their colleagues across the Atlantic, have been repeatedly asserting of late The children received no food but breast milk, and this may be taken as the second important factor in Dr Field s successful results Tl terference—a minimum o factor which must have pervision she exercised a dealing with newborn babies Clearly the care of the premature infant is linked up with the whole question of training in the medical schools and schools of midwifery and nursing Discussions of neonatal deaths in the past few months have emphasised this, and it is to be hoped that the Goodenough Committee has been strongly informed of the need for up to date education in this subject While we are waiting for adequate numbers of trained personnel, something could be done now to improve the care of the premature infant It needs, either in its own home or at a suitable centre, the care—without too much manipulation—of someone with special experience. Midwives and practitioners should be able to secure such help, perhaps on the lines of the "flying squad" which in many cases can be called in to cope with obstetrical emergencies. Supplies of breast milk should be available, and dietetic experiments with olive oil and yolk of egg (listed as suitable up to a short time ago in publications of a local authority) should be strongly discouraged. Brandy, so often the coup-de-grace of triplets and quadruplets reported in the daily press, should likewise be banned Oxygen, thyroid extract and in emergencies nikethamide are safer stimulants.

Dr Field cites the second week as the danger period for the premature infant, mainly on grounds of feeding difficulties The risk of infection also increases with the time the child remains in an institution, despite the measures she outlines to avoid it Too early discharge on the other hand may mean a high mortality rate after leaving hospital and it would be instructive to know what happened to the 170 survivors (out of 185) in her series who were discharged in a satisfactory condition. Half of all neonatal deaths in Great Britain are associated with prematurity. In other countries this figure has been materially reduced this is a challenge to the health services

The PRIME MINISTER has accepted the honorary fellowship of the Royal College of Surgeons of England on the occasion of the celebration of the centenary of the Fellowship.

UNIVERSITY OF OXFORD.—The Nuffield Provincial Hospitals Trust has made a grant of £2300 towards the salaries of the research workers engaged upon biochemical investigations of antibacterial substances under the direction of Prof. H W Florey, FRS

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Special Articles

EFFECT OF WAR CONDITIONS ON THE PREMATURE INFANT

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RECENTLY McNeil (1942), Collis (1943) and others have brought to our notice the high mortality of premature infants, accounting for approximately 50% of deaths in the first month of life. Further inquiries undertaken by the British Pædiatric Association show that the mortality-rate can be reduced to below 20% by " special pædiatric care, supported by skilled nursing (specially trained staff) in suitably equipped units." It therefore seems expedient to report the results of a series of 185 cases reared under adverse war conditions with the unusually low mortality of 8·1%.

This series includes infants of 5½ lb. or less born in a London hospital after the declaration of war in September, 1939, up to August, 1942, when different accommodation was found for them. Duration of stay in hospital was extended until they were making satisfactory progress, or were 5 lb. in weight, and it is during this period that the following statistics have been collected.

Accommodation.—In view of the danger from enemy air-attack at the outbreak of war, maternity cases were nursed and delivered in the basement of the obstetric hospital. Space was limited and with an increased number of deliveries the wards became overcrowded, stuffy and hot. As the windows were " protected " artificial light was the only means of illumination. In this atmosphere our babies were nursed. The lying-in ward had previously been an outpatient waiting-room, and we were therefore able to " isolate " the premature infants in a side room which also had to function as the sister's office. To this room students, nurses and medical staff had free access. Masks and gowns were worn by the nurse in attendance, but rarely by medical staff, students or other nurses passing in and out of the room. The air was the same as the main ward and the temperature rose on occasion to 80° F. in spite of the fact that special ventilation had been installed. No attempt at regulation of humidity was made, but human breath probably kept this at the optimum for the infants.

MANAGEMENT

Nursing technique.—This has been described in a separate paper (Edwards 1942) and briefly is as follows.

Immediately after birth the infants were wrapped in cotton-wool, placed in a warm cot and left for 8 hours. If breathing was poor or blue attacks occurred, 5% carbon dioxide in oxygen was administered intranasally. After this interval, if the condition of the infant was satisfactory, it was weighed, the cord was dressed, eyes were treated, and woollies put on without moving the baby from the cot except for weighing. The cot with baby was then moved from the labour ward into the sister's office. Not until the following day was it swabbed with olive oil. The body temperature was regulated by an electric blanket and as little handling as possible given. Great importance was attached to this latter point. No temperatures were taken either of the baby or the cot, it being found from previous experience that keeping the electric blanket at " low " on the thermostat ensured a cot temperature of approximately 99° F. The cord was only dressed every third day and the baby oiled twice a week. After the birth weight had been ascertained no further weighing was permitted until the fourth week. Finally, any change of clothing or bedding that was necessary was done after a feed. To ensure uniformity of management the least possible number of nurses attended the babies, three in the day and one at night and no other person touched the infants except the doctor, and then only when absolutely necessary.

Feeding.—This was begun 8 hours after delivery with a dilute feed of breast-milk given from a pipette. The importance of obtaining breast-milk cannot be overstressed and no other milk was given to our premature babies. Quantity and dilution depended on the size of the infant, but on an average for infants under 5 lb. in weight, two teaspoonfuls of a 50% dilution two-hourly was started, and increased by one teaspoonful of breast-milk per feed per day, omitting one feed at night. The diluting fluid used was Hartmann's Ringer-Lactate solution. This was preferred to glucose water as it tends to make the infants thirsty and therefore leads to a better intake of fluid. On the seventh day whole breast-milk was usually tolerated from a Breck feeder, and by the tenth day 8–10 oz. daily was taken, after which three hourly feeds were begun. The child was put to the breast when the sucking reflex was strong enough; this usually coincided with a weight of 4½–5 lb. Œsophageal feeding was never instituted because of the danger of aspiration pneumonia and also because it fails to give any stimulation to the sucking reflex which it is important to establish at an early date. The second week is a critical period for premature infants. They become reluctant with their feeds and therefore dehydrated, and it is at this stage that one or two timely subcutaneous injections of 50 c.cm. of 5% glucose in Hartmann's solution may save many lives.

Drugs.—In addition to oxygen, nikethamide was given occasionally but only as a life-saving measure. Dry extract of thyroid, gr. 1/10, twice a day was given as a routine for the first two weeks, and in the second week iron was commenced. By the end of the month vitamins A, D and C were included in the feeds.

RESULTS

Table I shows the mortality figures tabulated according to weight and table II according to the number of weeks premature.

TABLE

Birth weight lb.	*Cases*	*Deaths*	*Mortality* %
5–5½	91	0	0
4–5	55	1	1·8
3–4	26	4	15·4
2–3	8	5	62·5
1–2	5	5	100·0
	185	15	8·1

TABLE II

Weeks premature	*Cases*	*Deaths*	*Mortality* %
Under 2	78	0	0
2–4	54	1	1·9
4–6	22	1	4·5
6–8	20	8	40·0
Over 8	11	5	45·5

Cause of death.—Table III gives the duration of life and cause of death with any relevant obstetrical history in the 15 cases that died. In 4 cases cæsarean section was performed on the mother. At autopsy in 9 out of 12 cases, atelectasis was found; this was usually extensive, causing the whole lung to sink in water. There were 2 cases of tentorial tear; one of these infants had been delivered by cæsarean section and the other was an easy and rapid spontaneous vertex delivery, born in intact membranes. There was only one death from infection, pneumonia developing in an infant with a large meningomyelocele.

DISCUSSION

The unusually low mortality-rate of 8·1% among these 185 premature infants is noteworthy. The emergency war arrangements necessitating their nursing in a basement ward may have made environmental conditions more suitable in regard to temperature and humidity of the air; but the unfavourable surroundings are unlikely to have reduced the liability to infection; in fact, this danger was almost certainly increased—yet only one case died of an infection. The handling they received was reduced to a minimum and the number of attending nurses was only three in the day and one at night. The management was on routine lines as practised by others, breast-milk was given to every case, and like Collis (1943) we found the administration of thyroid extract helpful. It is probable, however, that the unusually high standard of nursing which was given to these prematures largely accounts for the low mortality. At a later date it is hoped to compare these results with a series of premature infants treated on similar lines, with the same sister in

TABLE III—DETAILS OF THE FATAL CASES

Case	Birth-weight	Weeks pre-mature	Length of life	Type of delivery	Condition of mother	Autopsy report on infant
	lb. oz					
1	1 4	11–12	30 hr	Bougie induction	Toxæmia	Atelectasis Patent interauricular sputum
2	1 8		5 days			
3	1 8	12–13	15 hr.	Spontaneous (vertex)	Normal, first pregnancy	Atelectasis
4	1 14	16	8½ hr.			
5	2 0	10–11	3 days	Cæsarean	Rheum mitral stenosis left ht failure	No autopsy, infant developed œdema
6	2 6	8	3 days	Spontaneous (vertex)	Rheum mitral stenosis	Patent interauricular septum
7	3 6		5 days			Myelomeningocele and pneumonia
8	2 14	6–7	30 hr.	Cæsarean	Chronic nephritis	Atelectasis
9	2 14	7–8	12 hr	Bipolar version, delivered as breech	Placenta prævia	Tentorial tear with subarachnoid hæmorrhage
10	3 0	6–7	5½ hr.	Cæsarean.	Chronic nephritis Rheum mitral stenosis	Atelectasis
11	3 2	6–7	24 hr.	Cæsarean	Disproportion	Atelectasis
12	3 5	8	24 hr	Induction (membranes ruptured)	Toxæmia	No autopsy
13	4 0	8	Under 24	Induction (bougie)	Chronic nephritis	No autopsy
14	4 3	4	4 days	Spontaneous (vertex)	Toxæmia, recurrent abortion	Tentorial tear, intraventricular hæmorrhage, patent interauricular septum
15	4 6	5	20 min.	Spontaneous (vertex)	Toxæmia (1st child died of icteris gravis)	Hydrops fœtalis, atelectasis

charge, but with different surroundings, as they are now being nursed in their prewar nurseries separated from their mothers.

to the following factors. First, to better obstetric technique, stressing the importance, in cæsarean section, of avoiding pre-operative morphine and general ether anæsthesia For vertex presentation he recommends

the head

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tages of episiotomy. We never give morphia before cæsarean section and favour local in preference to general anæsthesia Secondly, Lamb stresses the great importance of good keen nursing care and thirdly the pædiatric practice of "hands off"—two vital points in the management of these infants However, he strongly recommends feeding by the stomach-tube for those under 5 lb. in weight, a practice which we consider increases the danger of aspiration

the sucking reflex.

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per lb. body-weight per day This agrees with our

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Chicago City.

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n offers the

1. Ambulance service by the hospital
2 Premature ward care with special equipment for oxygen herapy and other types of emergency therapy.
3 Nursing service by a trained personnel
4. Breast milk obtained from wet nurses and visiting nothers

or instruction of the mothers,

to the promotion of breast milk

ne home reduces the number of

hospital days

7 An outpatient clinic maintained for instruction of mothers nd the care and supervision of graduates not having private hysicians

There are no comparable schemes to this in the British sles, in fact, there are very few special premature infant nits or wards. The premature infant has been sadly eglected.

SUMMARY

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The only comparable figures are those of Lamb (1930). His technique and management are described and compared with our own Reference is made to the Chicago City-Wide-Plan for premature infants which resulted in a reduction of mortality from 12 6% to 20 8% in five years.

I wish to thank Prof F J Browne and Dr W. J Pearson for their help and for permission to publish these cases, and Sister E M C. Edwards to whose skill and care must be largely attributed the low mortality in our series.

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) *Arch dis Childh* 18, 55

MILK AND PASTEURISATION

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So n July 3 was given

by National Institute

fo opening remarks

" he said, " is bound up with milk production, and milk production is bound up with British farming." The morning session dealt with the papers by Mr A , PH D, dealt wi aspects of milk

The theme of Dr. Mattick's address was that milk from healthy cows is virtually sterilised by pasteurisation, and even milk infected with pathogenic organisms is rendered safe for human consumption In an examination of 37 samples of bulk milk going to a certain creamery Dr. Mattick found that 28 contained active tubercle bacilli. TB is more resistant to heat than other common pathogens, and yet milk heated to 138° F. for 30 min. kills bovine and human TB. The official pasteurisation regulations prescribe 110° F. for 30 minutes, so this provides a margin of safety. The resistance of TB to destruction by heat is the reason why this organism has been adopted as a standard of reference of the efficiency of pasteurisation. Dr. Mattick believes that the "holding" method of pasteurisation will be superseded by the "flash" method in which the milk

162° F. for 10 seconds

ocess. He claimed that

ge scale of a good-quality

) would provide a fluid of

as yet scarcely dreamed

Dr. Kon pointed out that cow's milk provides a considerable proportion (one-seventh in the case of vitamin B_1) of various nutrients for adults, but supplies a proportionately greater amount of the child's requirements (e.g. one-third for vitamin B_1). Milk is rich in calcium and low in iron. Its vitamin-A content is highly variable and reaches its lowest ebb in April. This is probably due to the difference in cow's food at different times of the year. The vitamin-B_1 content of cow's milk is remarkably independent of food. This is probably because it is formed in the rumen by bacterial synthesis. There is some seasonal variation in the riboflavin content of milk, but the variation does not seem to be clearly connected with variations in diet; actually there is also probably some synthesis in the rumen. It is possible that the other members of the vitamin-B complex are also synthesised in the same way. The source of the vitamin D present in milk is nearly always from the action of sunlight on the cow's skin, and the vitamin-D content of milk is therefore greatest at the summer solstice. The vitamin-D content of milk can be increased by giving the cows irradiated yeast or vitamin-D concentrates, or by irradiating the milk. The effect of pasteurisation on the nutritive value of milk is very small. Almost the only changes caused by the holding method are a 20% loss of vitamin C and a 10% loss of vitamin B_1. The flash method has even less effect.

In England Now

A Running Commentary by Peripatetic Correspondents

THE Rochester Diocesan Conference held in London last November discussed five Christian standards by which economic situations and proposals may be tested. As a guest speaker, Sir William Beveridge opened the discussion of these standards and in his *Pillars of Security* (Allen and Unwin, pp. 216, 6*s.*) he comments briefly on each in turn. The first reads : " Extreme inequality in wealth and possessions should be abolished." Beveridge's comment is " To press for absolute equality of incomes for all men is unpractical. It is also a wrong aim, for it means attaching excessive importance to material things and treating envy as a master passion of mankind." The second reads : " Every child, regardless of race or class, should have equal opportunities of education, suitable for the development of his peculiar capacities." And the third is this : " The Family as a social unit must be safeguarded." Beveridge considers these two standards together. " Ought the family to be allowed to stand for inequality of opportunity ? " he asks ; and answers, " Yes, for two reasons : family life, its responsibilities and its cares, are the material of which most of human happiness for most people is made. Charles Darwin summed up happiness as ' Work and the domestic affections.' The work which different men find to do is of differing degrees of importance and interest. For a few it is an absorbing vocation, a complete life in itself ; for many it must be dull and heavy. But the domestic affections are for all men and women. The family is the means of vicarious immortality through children, the stepping-stone from selfishness to service, the common heritage and bond of all mankind. . . . In leaving it possible for parents who by special service to the community acquire special rewards to favour their children because they are their children, one works with nature—not against her." The fourth and fifth standards were these : " The sense of a Divine Vocation must be restored to a man's daily work " ; and " The resources of the earth should be used as God's gifts to the whole human race and used with due consideration for the needs of the present and future generations." Beveridge's comment is that " the resources of the earth are not spread evenly throughout the world. Some parts of the earth are definitely richer in resources—beneath the surface or in the climate—than other parts . . . it is inevitable that particular portions of the earth should become occupied by particular human groups—united in speech or character. The world cannot be governed as one, without barriers of national boundaries. But the proposition gets support from economics . . . whether the natural resources of a nation are great or small, they can be made more fruitful by cooperation with other nations, than by isolation."

On the sense of vocation Beveridge had less to say, because he was not brought up in any religious faith. to him it meant that in the daily life of each of us there should be something done, not by instinct but more and more consciously, without thought of reward, whether it is part of our paid work or not. Only as men come to see themselves, he concludes, as part of a large whole can the selfishness and strife which lead to self-destruction be banished from the world.

Here we have the philosophic background of Beveridge's scheme of social security. I believe I am not alone in thinking that the Government's decision to concentrate on certain parts of it, such as the health services, before the others, is to risk stultifying the whole.

* * *

That was certainly a beautiful day. My exam had occurred two weeks before, and this time I was through But there were still two potential failures in our small part of Chelsea. Sam had actually, like me, gone so far as to fail before, and Janet said that this time she *knew*. So, sitting in the garden, we were all in a pretty severe state of strain : Sam and Janet for obvious reasons Faith because her small child Jane was mewing away, Anne because she was going to Washington, and my sister Bridget and I out of beautiful sympathy. The postman took ages to arrive, and Sam's girl-friend came to get windy too. I went indoors, and Janet went back to her flat to clean the stairs. She did not like cleaning the stairs ; she was placating the gods. And then there was suddenly a tremendous noise in the garden. It was Sam, after passing. " I've passed ! " he was crying " I'm a doctor. Will someone please fetch a doctor ? " With one of her inimitable gestures Anne expressed he happiness. " My dear ! " she said. " Can you prescrib me some laco-calamine before the shops all close ? We rang up Janet, who had reached the stair before th last, and she finished the stairs and went out to find th postman. Faith's child Jane went precipitately t sleep, performing the second most gratifying of her fou functions. Janet saw the postman at the end of th street and walked towards him. " Is there a long envelope for Frazer ? " she said. " It's terribly importan The postman said yes, there was. He had the secon sight, he said ; it was all right. Janet said could sh have a sight too ? He said " yes," fumbling with th piece of string. " I have the second sight," he said " it is quite all right." He held the envelope in h hand. " It feels light," he said ; " that is a good sig And fortunately I have the second sight." She opene it, and she was through as well. I have seldom in m life known such good weather as we had on the thir Saturday in April.

* * *

I should like to define a hobby as an occupati followed mainly or entirely for the pleasure it gives to follower. There may be gain as a secondary result the pigeon-fancier's prize, or the amateur journalist 10*s.* a thousand words—but the main motive must pleasure. This definition has the advantage of includi those by no means rare cases whose hobby is their wor Though in some ways this may be an ideal state, it h its disadvantages, all too familiar to those of us w look after retired people. Excluding this group, I ha been wondering how far hobbies have affected histor I cannot see that the Prime Minister's brick-laying a picture-painting have directly contributed to Hitle present situation ; though the opportunity they ga for uninterrupted thought during his sojourns in political wilderness may have been important. Ner musical exploits have provided plenty of opportu for our press cartoonists, but have a small place in decline and fall of Rome. Mr. Will Hay discovere new star, but since astrology has been banished fr statecraft this is not epoch-making. Royal and dential philately may have influenced stamp de Albert the Good's love of exhibitions gave us So Kensington and the Crystal Palace, but this come into the category of work. There was one hobby which did change the face of Britain. Henry was not only an archer, a huntsman and a gourmand also a first-rate amateur theologian. A pamphlet his pen prompted the Pope to confer on him the titl Defender of the Faith. Later, when the breach ca he felt fully competent to take over the directio

Church affairs, and personally supervised the production of the Church of England's first liturgy.

The study of hobbies as a clue to psychiatric diagnosis seems worth while exploring. Some hobbies, such as stamp-collecting and fretwork, surely indicate obsessional trends, with the usual concomitant anxiety. Gardeners could probably be subdivided into a meticulous obsessional group, and a more adventurous manic type. Collectors of such quaint objects as match-boxes and German beer mats might be found to have an unsuspected touch of the bizarre in their mental make-up. An arm-chair psychiatrist might do worse than begin by studying the hobbies of the great.

* * *

[illegible] other afternoon. [illegible] .ther, the mother, [illegible] the cook. They [illegible] the nicknames of Ba, Fran, Kit, Louie, Pat and Phil, but not respectively. When I arrived, Ba was in eclamptic fits, and Louie, who had cut his thumb, was bleeding profusely. I soon ascertained that the son was group B, Fran was group II, Kit was group I (Moss), and Pat was group I (Jansky). I was told [illegible] ıst not receive a [illegible] Fran came home [illegible] given a transfusion to Kit some years ago, and that Kit had also given a transfusion to mother, but this had not cured mother's senile endometritis. (*Puzzle:* Attach each nickname to its owner.)

Parliament

ON THE FLOOR OF THE HOUSE

MEDICUS MP

ON May 18 the United Nations Conference on Food and Agriculture met at Hot Springs, Virginia. Judge Marvin Jones, chairman of the USA delegation, was elected chairman and presided over the sittings which continued until June 3. Delegates of 44 nations attended, including Australia, New Zealand, Canada and South Africa. India and China each sent a delegation, South America was well represented, the Near and Middle East were represented by Egypt and Ethiopia, Iran and Iraq. The USSR delegation was headed by the Deputy People's Commissar for Foreign Trade. Occupied countries in Europe had their spokesmen. A report on the conference and a record of its main conclusions appear as a White Paper under the title "Final Act of the United Nations Conference on Food and Agriculture" (HMSO, 9*d*.).

The recommendations of the conference cover a long-term policy to increase world food production and consumption in all countries of the world to a satisfactory level of nutrition and a short-term policy to provide for immediate postwar needs. Speaking of the world as [illegible] r been [illegible] .stified [illegible] The first cause of hunger and malnutrition is poverty." The importance of the recommendations can hardly be over-emphasised. But it needs to be seen in the perspective of international organisation for its place in the postwar world to be seen. The aim is to free mankind from want and the conference has set up the machinery by which, if it is used, this aim can be achieved.

The basis of the discussions was in fact laid by the League of Nations before the war when it assembled scientific representatives of world opinion to draw up standards of food and diet. The Final Report (Geneva 1937) of the mixed committee of the League of Nations on the relation of nutrition to health, agriculture and economic policy may be regarded as one of the foundation stones of this new world policy. Another is the realisation of the need for a system of international security. The conference approved "the principle of [illegible] to [illegible] ill [illegible]" [illegible] al [illegible] government and other national services in marketing, and a wide range of other matters bearing directly on the provision of food for all. A great part in influencing the conference decisions has been played by consideration of the needs of the "vulnerable groups" of the population—pregnant and nursing women, infants and [illegible] receiving low incomes—of the [illegible] to disease, and of deficiency dise[illegible] tion is that national nutritional organisations shall be set up all over the world.

After the first world-war we had visions of "homes for heroes" dangled before our eyes and a League of Nations was created based on diplomatic and political considerations. After the war we no doubt hope for many changes, but it is of primary importance that what Mr. Eden called "this first experiment in comprehensive international discussion" should be founded on objective economic discussions, guided by the medical sciences, directed to that vast and neglected province of ill health —poverty, deficiency disease and malnutrition.

MILK POLICY

IN the House of Lords on July 8 Lord WOOLTON, Minister of Food, announced the measures which the Government propose to take to improve the quality of the milk-supply and the issue of a white paper (Cmd. 6154) setting them out in detail. The basis of a sound milk policy, he affirmed, must be a well-bred healthy dairy herd. At present a large number of herds in the country were not inspected at all. It was proposed in future to arrange for a minimum of one inspection a year for every dairy herd, and to inspect more frequently within the limits of the available veterinary personnel those herds with a bad disease history or where the milk was not heat-treated before sale. To ensure the production of a cleaner milk the National Milk-testi[illegible] and Advisory Scheme was introduced last year. [illegible] those concerned were coöperating to make the sche[illegible] a success and already over 70% of [illegible] produc[illegible] were having [illegible] le nea[illegible] 90% of the [illegible] schem[illegible] With a view [illegible] and uniformity [illegible] methods of milk production the Government wou[illegible] submit to Parliament, after consultation with lo[illegible] authorities in England and Wales, legislation providi[illegible] for the transfer to the Ministry of Agriculture of t[illegible] functions at present exercised by local authorities [illegible] regard to the production of milk, including designat[illegible] milk, on the farm. In this way the Ministry wou[illegible] become responsible for all matters relating to the pr[illegible] duction of milk. Owing to transport difficulties mu[illegible] of the TT milk now produced was not sold to the publ[illegible] as such, but was bulked with and sold as ordina[illegible] milk. In order to encourage the production of th[illegible] valuable milk, the Government proposed to pay [illegible] uniform production premium of 4*d*. per gallon. Di[illegible] tributors would cease to pay premiums to producers f[illegible] TT milk. The Minister of Food would take all pract[illegible] cable steps to ensure that as much TT milk as w[illegible] possible in present circumstances would be sold as suc[illegible] to consumers. The price would be only slightly high[illegible] than for ordinary milk. The schemes introduced by th[illegible] Ministry of Food for the rationalisation of retail di[illegible] tribution of milk had deprived the public in areas [illegible] which such schemes applied of their freedom to choos[illegible] their milk suppliers. In some cases therefore person[illegible] who previously made a point of buying pasteurised [illegible] TT milk might now be [illegible] milk. This placed up[illegible] tion to ensure as soon [illegible] to consumer[illegible] schemes sho[illegible] andards o[illegible] purity which [illegible]

The Government's intention was to prohibit in area[illegible] to be scheduled by the Minister of Food the reta[illegible] sale of milk unless it was either

TT milk,

Accredited milk sold by a retailer who sold th[illegible] milk of a single accredited herd, or

Milk which had been rendered safe by heat treatment.

This policy would be applied in all areas [illegible] schemes for the rationalisation of retail distr[illegible] rapidly as the necessary plant could be mad[illegible]

Certain adjustments in the application of the policy to Northern Ireland would be required. The Government's proposals for heat treatment and for increasing the incentives for the production of quality milk are applicable to Scotland, but Scottish local authorities will continue to exercise their present functions.

Mr. R. HUDSON, Minister of Agriculture, who made a similar statement in the Commons, added that improved milk production depended also on a sound breeding policy. Indiscriminate cross breeding must be avoided, diseased and unthrifty cows weeded out, and more good dairy bulls from recorded herds reared as a means of grading up the ordinary commercial herds. Progress in these directions could best be achieved by greater concentration of milk production on the larger dairy farms, where there was often scope for an increase in the number of cows kept, in the yield per cow, and in winter milk production. The ever-increasing demand for milk required a corresponding increase in the supply of good replacement stock. There was no discussion on the statement, but Mr. EDEN thought it possible that a debate might be arranged before the recess. Dr. EDITH SUMMERSKILL confessed to some disappointment at the statement and asked if Minister's scientific advisers had assured him that milk from accredited herds was as safe as pasteurised milk? But Mr. HUDSON refused to be drawn into a subject which he declared was a matter for the Ministry of Food and not for him.

FROM THE PRESS GALLERY

Feeding the World

IN the House of Commons on July 6 Mr. EDEN said the Government had no hesitation in accepting the resolutions drawn up by representatives of 44 nations at Hot Springs and the obligation to give effect to them in so far as they applied to conditions in the UK. They would also coöperate with other governments in seeking ways to give effect to those resolutions which called for concerted action. The main object of the conference was to ensure freedom from want of food. The third resolve was to start now with the task of increasing food resources and improving diets in accordance with the principles laid down. Despite war-time difficulties the Government would press on with this aim. That freedom from want of food depended largely on factors outside the scope of purely agricultural or nutritional policy was clear to the conference; international security and economic expansion were the necessary background for a higher standard. The Government would participate in establishing an Interim Commission to carry on the work of the conference and to prepare for permanent organisation in the field of food and agriculture. One of the tasks of this commission would be to draw up a declaration for the consideration of governments, recognising their obligation to collaborate in raising the level of nutrition and to report to one another on progress. The conference was not concerned with the organisation of postwar relief, but attention would be paid to the necessity of increasing supplies of basic foodstuffs in the period when occupied territories were liberated.

On the same day in the Upper House, Lord WOOLTON said that it had been no mere conference of theorists or dreamers, but of practical men, scientists, administrators, experts with first-hand experience of solving problems of food and agriculture in peace and war. The agreement of representatives of many countries was very heartening. The first few years after the war would be a time of great stringency on the food front. The Government accepted without reserve the view that the coördination in procuring food-supplies must go on as long as shortages continued. Until there was enough food to go round luxuries would have to wait. We had already pressed our production of food crops and milk at the expense of meat, eggs and butter almost, if not quite, to the limit of safety. If there was not to be scarcity when the war was over, we must start now to increase world production of basic foodstuffs. If nations jointly and severally accepted and discharged the responsibilities of seeing that their people had the food needed for life and health they would create a demand for food which would provide an ever-expanding market for the oduce of the great food-exporting countries.

Nurses (Scotland) Bill

This bill was read a second time in the House of Lords on July 7, and passed through committee on the following day.

QUESTION TIME

Death of a Rifleman

Mr. RHYS DAVIES asked the Secretary of State for War what action he proposed to take in the case of the doctor responsible for certifying the late Rifleman W. C. Clayton, in respect of whose death in a military detection barracks sentences were delivered against two warrant officers at a recent assize.—Sir A. SOUTHBY asked what action was being taken in respect of the military doctors who failed to ascertain the true medical condition of Clayton.—Mr. J. DUGDALE and Mr. F. J. BELLINGER asked whether in view of the court's findings in connexion with Clayton's death he would cause an independent public inquiry to be held into conditions prevailing in military detention barracks.—Mr. H. THORNEYCROFT asked what action he proposed to take against the medical officer who, after examination, ordered medicine and duty in the case of Clayton, who was suffering from deafness and advanced tuberculosis.—Mr. T. E. N. DRIBERG asked i the court of inquiry would be held in public.

Sir JAMES GRIGG replied: The Government have decided that an independent inquiry should be held into conditions at Navy and Army detention barracks generally. It would of course be for the inquiry itself to determine the conduc of its proceedings. In the meantime the military court o inquiry on the special case was sitting; in accordance with usual practice this inquiry would not be open to the public He had received a report on the responsibility of the military officer, but was not yet in a position to say anything about it

Will the Minister see that the terms of reference lay particular stress on inquiring into the action of the doctor who failed in his duty and did not see that the man was ill?—I could not give any terms of reference to the court which would seek to prejudice any question in advance.

In answer to further questions Sir J. Grigg said that what the Government had in mind was an inquiry conducted by a High Court judge with assessors, probably from outside, as well as some military. The terms of reference would cover medical arrangements.

At a later stage the responsibility of the doctors who passed Clayton as fit for Army service was raised again by Capt. CUNNINGHAM-REID.—Mr. G. TOMLINSON, parliamentary secretary to the Ministry of Labour and National Service, said the case was now being inquired into and the Minister was not prepared to give partial information in advance of the results of the inquiry.

Rejections of Men Over 40

Mr. E. BEVIN told Sir L. LYLE that the percentage of men over 40 rejected for national service on medical grounds was about 45.

Reasons for Rejection

Mr. T. H. HEWLETT asked the Minister of Labour if he would ensure that when doctors discovered, on medical examination, any latent disease of which a called-up man might be unaware, he was in all cases told the exact reason for his rejection so that he might take private advice.—Mr. TOMLINSON replied: It was formerly the practice to do this but the results were found to be unsatisfactory for various reasons. It is now the practice in such cases for the medical board to advise the man to consult his own doctor.

Masseuses and Commissions

Sir F. FREMANTLE asked the Secretary of State for War why the same prospect of advance to commissioned rank given to nurses and to physiotherapists in overseas fo was refused to women specially trained as masseuses and other physiotherapists; and whether he would receive deputation from the CSMMG on the subject.—Mr. A. HENDERSON replied: Massesuses are employed by the War Department as civilians under conditions of employment accepte by the chartered society. This arrangement was w satisfactorily but he would gladly see a deputation Sir F. Fremantle retorted that the chartered society wa anxious to have commissioned rank which was not same thing as being employed as civilians from outside Army.

Mentally Deficient Children

Mr. R. W. SORENSEN asked the Minister of Health if he was aware of the increasing number of mentally deficient children for whom appropriate institutional treatment could not be given; that many were sent to general public hospitals; and whether he would take steps to deal with this situation and make adequate provision for the post-war period.—Mr. E. BROWN replied: [illegible] as a temporary measure, to public general hospitals. The postwar need [illegible] cannot [illegible] something to meet the very grave situation in regard to mental defectives?—I am doing all I can.

Alien Doctors

Sir ROBERT YOUNG asked the Minister how many doctors of the allied and neutral countries were engaged as medical attendants and specialists in our hospitals; whether there was any bar to such doctors acquiring British medical qualifications; whether any application for such qualifications were subject to Ministry of Health approval; and whether this also applied to refugees from enemy countries.—Mr. BROWN replied: The number of doctors of allied and neutral countries employed as such in hospitals is 200. I regret that the number of specialists included in this total is not available. An overseas doctor may acquire a British medical qualification by passing one of the qualifying examinations after the appropriate period of study. He may also be placed temporarily on the British Medical Register if the General Medical Council are satisfied that he fulfils certain prescribed conditions as to the holding of medical diplomas and otherwise. My approval is not required for the qualification or registration of an individual doctor.

Medical Aid Societies

Lady APSLEY asked the Minister whether, in his negotiations for the establishment of a universal state medical service, voluntary medical institutes would, in view of their long established activities and wide experience, be afforded an opportunity to cooperate.—Mr. BROWN replied: In connexion with the discussion for a comprehensive health service, I hope fairly soon to issue a general statement which may serve as a focus for the views of all interested bodies, and I have undertaken at that stage to get into touch with the associations of medical aid societies.

NFECTIOUS DISEASE IN ENGLAND AND WALES

WEEK ENDED JULY 3

Notifications.—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 1084; whooping-cough, 2249; diphtheria, 608; paratyphoid, 10; typhoid, 8; measles (excluding rubella), 4165; [illegible] influenzal), 30; puerperal p[illegible] fever, 49; poliomyelitis, 5; [illegible] encephalitis lethargica, 5; dysentery, 120; ophthalmia neonatorum, 19. No case of cholera, plague or typhus fever was notified during the week.

[illegible]

Deaths.—In 126 great towns there were no deaths from enteric fever, 1 (1) scarlet fever, 1 (0) from measles, [illegible] (0) from whooping-cough, 10 (1) from diphtheria, 31 (3) from diarrhœa and enteritis under two years, and [illegible] (0) from influenza. The figures in parentheses are those for London itself.

The number of stillbirths notified during the week was [illegible] (corresponding to a rate of 28 per thousand total births), including 16 in London.

WAR-TIME DECLINE OF ACUTE RHEUMATISM.—Dr. Alison [illegible]er's figure for the actual number of deaths from rheumatic fever in 1942 (*Lancet*, July 10, p. 51) should read 501.

Letters to the Editor

SWABBING OF CONTACTS IN DIPHTHERIA

SIR,—On p 25 of your issue of July 3, in a memorandum produced by the fever group of the Society of MOHs, we were astonished to read: "Routine swabbing of contacts, except in special circumstances—e.g., certain institutional outbreaks—is to be deprecated, and should at any rate be restricted to those showing an unhealthy nasal or pharyngeal mucosa. The child with a healthy throat and nose is not likely to harbour the KLB for more than a very brief period, and . . . is not likely to disseminate diphtheria." This remarkable statement cannot pass unchallenged. We have repeatedly met carriers of fully virulent diphtheria in which there has been no visible abnormality of nose or throat. It is this very lack of abnormality that makes the carrier so difficult to deal with.

Without searching our records we have [illegible] four outbreaks of [illegible] a previous case. [illegible] swabbing of cont[illegible] technique in the diagnosis of the carriers was out of date.

We do not feel that our expenditure of "time and material" in the swabbing of contacts is wasted, if, as the memorandum admits, it leads to the occasional discovery of a healthy carrier. Such a carrier may in a very short time produce a fatal case of diphtheria. The complete isolation of healthy carriers is no doubt a counsel of perfection; but at the very least a carrier must be put on his guard and warned against too intimate a contact with non-immunised children or susceptible adults—for example, in his own family.

PATHOLOGISTS
in charge of the 8 Emergency Public Health
Laboratories of the London Sectors.

THE PROPER PLACE FOR CHILDREN

SIR,—There will of course be general agreement with Dr. Back (in your annotation of July 3) that the place for the child under 2 is at home, provided it is a good home with a satisfactory mother, but there are probably as many bad homes as good [illegible] admission [illegible] hospital four times in six months. At this hospital a day nursery has been installed by the city authorities, a floor of closed beds being utilised for the purpose. The hospital policy was laid down in the annual report of 1941 as follows:

> "It should be stated that this offer by the voluntary hospitals does not imply that their medical staffs or the boards approve the establishment of day nurseries as institutions which shall be retained after the war; by some at least the nurseries are regarded as disagreeable war-time necessities to deal with a difficult situation, but it is hoped that their experience and cooperation, particularly in relation to infectious disease, may prove of value to the city. Care is taken to avoid the slightest contact between the healthy children in the nurseries, and sick patients in other wards or buildings.
>
> "Two wards have been established here as a day nursery and have proved workable. There are some 80 children in daily occupation, and the board has recently agreed to a part of the accommodation being used for what is practically a residential nursery to help mothers who work on shifts, and therefore cannot enjoy the usual day-time facilities."

If day nurseries continue after the war they should be linked up with children's hospitals or children's departments of the large hospitals and a fuller pædiatric service organised.

With regard to children under one, the board has recognised that these babies, many of them poor specimens of humanity, needed individual care and attention, and has built a separate babies' block of 69 cots, two children to a cubicle with a glass screen separating them.

HAROLD F. SHRIMPTON,
Children's Hospital, Birmingham. House Governor.

REHABILITATION OF THE TUBERCULOUS

SIR,—Dr. McDougall in his letter (*Lancet*, June 26) stresses an important difference in Papworth and Preston Hall policies—namely, permanent and temporary residence. I would like to call attention to an aspect not mentioned in his letter, and that is the patient's point of view. I have had the opportunity of discussing the matter fully with a number of patients from both settlements, and am satisfied that the Papworth policy gives the patient a feeling of future security lacking in the Preston Hall policy. The policy of keeping arrested patients in Papworth Village Settlement has certainly not led to stagnation. After five years in a village settlement, the opportunity of subsequently earning one's living does not always exist. What percentage of ex-patients do actually earn their own living?

Dr. McDougall mentions assessing the patient as distinct from the disease, but omits an even more important factor, assessing the patient's reactions to conditions. The virtue of village settlements is that the working and the living conditions are suitable, whereas we know that this does not apply outside the settlement, and therefore a lesion remaining arrested in a settlement does not necessarily remain so after discharge. I do know that a number of these ex-patients live with their families under unsuitable conditions, and that a number, sooner or later, have to be admitted to sanatoria, or to tuberculosis wards in county hospitals. It would seem that permanent social security for a limited number is preferable to temporary security for a larger number.

Dr. McDougall concludes: "Except by the expensive process of building more and more houses, no new cases can be taken into the village settlement so long as places are being occupied by groups of men for whom there are no longer any solid medical grounds for continued residence in the settlement." I do not understand the meaning of "solid" medical grounds, but it appears obvious that it is largely finance which dictates the policy of discharging patients; the policy is not one of choice. If tuberculous patients have to be discharged after three to five years in a settlement, it is essential that they should be supplied with satisfactory home conditions and placed in suitable industries with an adequate income.

Unfortunately in every branch of tuberculosis work, policy is controlled by financial considerations, and this control is much increased by the present system of water-tight financial liability of various different authorities, which does more than anything else to prevent eradication of the disease. Tuberculosis is a disease of national importance; surely the time has come for it to be dealt with on a national basis.

H. J. ROBINSON.

MR. HUXLEY'S EYES

SIR,—I have read with great interest the letter from Mr. Affleck Greeves in your issue of June 5. In it he says that my hypothesis of Mr. Huxley's eye defect will not bear scrutiny. Unfortunately he does not give his grounds for this statement, but instead he goes on to describe an hypothesis of his own. When I was working at the details of my hypothesis I took care to make it fit in with the various phases of Mr. Huxley's illness. I was therefore surprised to find that Mr. Greeves had not done the same thing. For example he says: "pari passu with the resolution of the uveitis these deposits are absorbed or, less commonly, are replaced by newly organised fibrous tissue. No corneal deposits would therefore have been present, &c." On the contrary, Mr. Huxley states (preface, p. 7) that the opacities of his cornea had remained unchanged for upwards of 25 years. It is clear that Mr. Greeves's hypothesis does not fit Mr. Huxley's description at all, nor does it explain the hyperopia and astigmatism from which Mr. Huxley suffered. Lastly Mr. Greeves asks whether the rapid improvement of Mr. Huxley's vision (when he had adopted Dr. Bates's methods) may not have been of a functional nature. In my opinion the reply to this question must be, "Certainly not entirely functional." My reason is that Mr. Huxley clearly states, "And the opacity has cleared sufficiently for the worse eye, which for years could do no more than distinguish light from darkness, to recognise the ten foot line on the chart at one foot." This clearly is not entirely a functional change. I feel therefore that it is Mr. Greeves's theory that will not bear scrutiny, for in many important respects it does not fit in with Mr. Huxley's account.

There is one point in my article (May 22) which I didn't make as clear as I would like. I stated that in my opinion Mr. Huxley's cure was not due to Dr. Bates's methods but to the vigorous eye movements which form a part of some of the exercises. Some of your readers may think that in making such a statement I am splitting hairs. So may I point out that many of Dr. Bates's exercises do not involve eye movements at all—for example, passive relaxation (p. 36), palming (p. 37), imagining black (p. 37), blinking (p. 41), breathing (p. 43) and central fixation (p. 55). I find it hard to believe that exercises like these did Mr. Huxle opacities any good. The ones which seem the m likely to have done good are those where rapid e ball rotations were performed. But better ones t those of Dr. Bates could, in my opinion, readily devised.

Cambridge. HAMILTON HARTRIDGE

HYDATID DISEASE IN WALES

SIR,—As one who has performed many autopsies Wales, especially in its northern counties, I can confi the findings of Surgeon Lieut.-Comdr. Wolfe (*Lan* June 26, p. 795). One of my brain cyst series had b regarded in life as a cerebral tumour, while three oth had been thought to be epilepsy. A gamekeeper had had "trouble with his liver" for twelve years found to have multiple hepatic and three intrathora cysts. It is perhaps unusual to be infected by a f one of my cases, a cripple who was never in contact w dogs and whose hobby was skinning foxes for people w wanted the skins for showcases and the like, seems have been infected in this way. Practitioners in W should keep the possibility of hydatid cysts in mind, when in doubt make early use of intradermal, comp ment-fixation, and differential leucocyte tests counts.

Runwell Hospital, Essex. ARWYN ROBERTS.

LIBRARIES AND LEARNED PERIODICALS

SIR,—After this war, even more than after the f war, learned and scientific libraries will be faced with problem of attempting to fill gaps in their sets of p cals caused not only by the inability to obtain jou from enemy and enemy-occupied countries during war-period, but also by losses at sea and by des in air-raids over this country. As stocks in Europ countries may also have been destroyed in a there is likely to be a shortage in many cases, and in o to prevent an unseemly scramble on the part of individ libraries to get volumes of which there may be insufficient number of copies to go round, it is hi desirable that a representative and impartial body sho decide on a national scale to which libraries the availa copies should be allotted.

This allocation should form part of a much la scheme whereby the present holdings of learned per cals in all important libraries in the country wo surveyed and the needs of research in the various of learning assessed, due regard being had to exis subject specialisations in various institutions. changes of stock could then be arranged so as to e the presence of complete sets of important public in the libraries where they are most needed and elimination of many incomplete sets where they are used. This may entail on the part of some libraries sacrificing of treasured possessions, but it woul greatly to the benefit of research workers as a The obvious body to undertake responsibility for work is the Library Association, which by its charter is entrusted, among other tasks, with pro the better administration of libraries and enco bibliographical study and research. In practice probably be found most economical for the actual to be done at the National Central Library, wh machinery for this kind of undertaking already exis would only need expanding. Funds for the would no doubt be forthcoming.

At least two such schemes in limited fields of ledge—those of German studies and of medi were already being prepared before the war. The which was being undertaken by the joint standing com- [illegible] of the Association of [illegible] have reached the stage of [illegible] ocks, the latter, a much [illegible] auspices of the university and research section of the Library Association was only in the preliminary stage of making the survey of holdings, when it was interrupted by the war Possibly a further extension of such special subject schemes might be the best way of tackling the job When this work has been completed, but not till then, it will be possible to compile the really satisfactory union catalogue of periodicals in British libraries that is so much needed to supersede the present incomplete *World List of Scientific Periodicals* and *Union Catalogue of Periodicals in University Libraries*

London School of Hygiene and Tropical Medicine
CYRIL C BARNARD,
Librarian

TREATMENT OF OSTEOCLASTOMA

SIR —The comments on my article suggest that I should amplify the information given My conclusions were based on 20 years experience but because of the obvious shortage of paper I selected only 5 cases to illustrate my points I saw the lesions, examined them with the advantage of the clinical observations of experienced surgeons, radiographed them and examined the biopsy or amputation specimens and the histological preparations together with their interpretations by experienced pathologists In cases 1, 2 and 3 there was at no time any difference in the opinion of surgeon pathologist and radiologist as to the diagnosis of osteoclastoma The clinical, radiographic, macroscopic and microscopic evidence of the tumour in case 3, at amputation 16 years after the primary observations which established the osteoclastomatous nature of the lesion, indicated malignant metaplasia—a phenomenon I have observed at the site of other simple lesions treated surgically Case 4 showed the clinical and radiographic characters typical of an osteoclastoma and though the pathologist interpreted the [illegible] those of a degenerat[illegible] [illegible] do not present [illegible] and, what is more, do not respond so completely to treatment The clinical and radiographic histories of case 5 satisfied the surgeons and myself th[illegible] oclastoma [illegible] Mr C[illegible] [illegible] ttle evidence [illegible] hey possess, [illegible] 4 and 3 were chondrosarcomata few men with wide knowledge of bone tumours would be so bold Of my selected 5 cases Mr Griffiths writes All his patients were unusually young to be suff[illegible]

[illegible] to explain why Mr Griffiths is able to give n account of 4 cases in which diagnosis was wrong and e treatment was 'haphazard, unscientific and possibly dangerous", for no one has any definite evidence that X radiation converted these tumours into sarcomata My statement that biopsy is neither necessary or desirable was directed solely to the welfare of the patient An orthopaedic surgeon once said that there was no necessity for the pathologist or radiologist to lose a wink of sleep over the diagnosis of a bone tumour, r that was the province of the surgeon Surely the pathologist or radiologist can make himself equally competent to [illegible]

[illegible] could if he wished acquire a unique experience which ought to be valuable to the community

The object of my paper was to show (1) that ther by radiography, nor by histology, nor by both, t possible to state in any given case that amputation l eradicate the tumour and prevent death from tastases, (2) that biopsy in such cases yields no litional information to the experienced radiographic erver—it may even complicate the issue, and that tumours having the radiographic characters typical of osteoclastoma respond to radiation, and limbs with joints which appear hopeless may be saved and made serviceable

It does not matter what the interpretation of the histology may be in those cases which the experienced radiographic observer believes to be osteoclastoma if the limb and joint can be saved by good response to X radiation Of the bone tumours which are not cured by radiation it has not been proved that radiation before amputation jeopardises the patients' chances of recovery All my experience is that it enhances the chances of cure and may obviate amputation

Birmingham
JAMES F BRAILSFORD

Notes and News

MOUTH BREATHING

Dr J M HAMILL writes Mouth breathing exerts an inimical action upon the nasal mucous membrane even when the nasal passages are clear enough to permit easy breathing when the mouth is closed When the mouth is open the amount of air which passes through the nose is not sufficient properly to ventilate the mucous membrane with the res[illegible] that it becomes congested [illegible] blocks the nasal passages [illegible] breathe quite well through [illegible] day, but who at night breathed through her mouth, her nasal mucous membrane then became so congested that she often had to sit up to obtain relief, and even inhaled benzedrine vapour to reduce the congestion before she could sleep again Before I saw her she had tried several varieties of buccal gags and bandages, some designed to keep the lower jaw from dropping during sleep, but had found them uncomfortable

The lower jaw normally drops during sleep and should be allowed to do so, to prevent mouth breathing it is sufficient to keep the lips in apposition This can be attained by taking a strip of adhesive tape 1 in wide and about 1¼ in long and applying it vertically across both lips after they have been tightly closed Any slight leakage of air through the lips is insufficient to diminish significantly the air flow through the nose, and the lower jaw can relax comfortably The wearer quickly becomes accustomed to the tape and unaware of its presence The patient mentioned above had comfortable sleep from the first night she tried the tape and all her trouble has vanished

Ordinary rubber adhesive tape can be used, but transparent 'Cellophane' adhesive tape is lighter more comfortable and easier to remove in the morning All that is necessary is to strip off the tape and wipe off any adhesive adhering to the lips with a little fat or cold cre[illegible] e adhesive material [illegible] tant and may cause [illegible] I use transparent [illegible] Leicester) which is non irritant

National University of Ireland

At recent examinations at University College, Cork, the following candidates were successful,

MD —E J Cantillon Thomas Creedon Nora A Hayes D J O Callaghan
MCh —M D Hickey and R E O Driscoll
MAO —J B Kearney

[illegible] Dowling Thomas Gleeson Lawrence Godfrey Mary A Hegarty F L Herlihy Muriel C Hurley J J Medalia Mary P Moroney Catherine M Murphy J P D Murphy E J O Connell Eileen A O Mahony, Jeremiah O Mahony, Ronan O Rahilly Joan B Ormond C W Pearson J G P Power P J Quinlan Bridget M Quinn L D Renouf Margaret M Ronan, T J Scannell J J Sheehan and Winifred A White

University of Bristol

At recent examinations the following were successful

J F Beriss, M P Bourke A G M Davies Meriel I Griffiths, O H Gurd, Elisabeth Hodson Lois M Leitch D I Olliff Mildred I Pott, D A Sarsfield S S Short and T R Stephens

Medical Society of London

[illegible] at 11, Chandos Street, W 1, on [illegible] r, when Mr Wanless Dickson will [illegible] physiological aspects of fatigue, fibrositis and arthritis.

Royal College of Surgeons of England

At a meeting of the council of this college held on July 8, Sir Alfred Webb-Johnson was re-elected president and Mr. H. S. Souttar and Sir Girling Ball vice-presidents. Mr. Vivian Greenish was elected a member of the board of examiners in dental surgery for three years.

The following were elected for the ensuing year:—

Hunterian professors.—Prof. G. Grey Turner, construction of the ante-thoracic œsophagus; Surgeon Rear-Admiral G. Gordon-Taylor, surgery of peptic ulcer, with special reference to regional and splanchnic anæsthesia; Lieut.-Colonel St. J. G. D. Buxton, gunshot wounds of the knee-joint; Prof. A. B. Appleton, bronchi and blood-vessels of the lungs; Mr. W. S. Adams, acute otitis media in children and the response of the infection to sulphonamide therapy; Mr. J. B. Oldham, coccygeal sinus; Dr. J. F. Brailsford, plasticity of bone; Mr. T. Holmes Sellors, constrictive pericarditis; Mr. T. M. Tyrrell, surgery of the lacrimal sac; Dr. R. B. Zachary, factors influencing recovery after nerve suture.

Arris and Gale lecturers.—Dr. N. M. Goodman, supply of subjects for dissection; and Dr. Herbert Haxton, the function of the patella; and the anatomy of progression.

Erasmus Wilson demonstrators.—Mr. L. E. C. Norbury, Mr. R. Davies-Colley, Mr. C. E. Shattock, and Surgeon Rear-Admiral C. P. G. Wakeley.

Arnott demonstrator.—Prof. A. J. E. Cave.

The fourteenth Macloghlin scholarship was awarded to Michael Hatton, of Epsom College.

A diploma of fellowship was granted to Arthur Martin Lindsay Smith, MB MANC. The following diplomas were also granted jointly with the Royal College of Physicians:

DPH.—David Hewspear, A. S. Hoseason, Joyce B, M. Mayes, and S. J. Sutton.

DPM.—Charles Anderson, H. M. Cohn, D. L. Davies, Wilhelmina L. Devlin, Elizabeth P. Dodds, H. M. James, Joan E. Mackworth, and R. R. Prewer.

DLO.—J. C. Liddle, P. S. Meyrick, and C. P. Williams.

Medical Honours

The awards made on the occasion of the King's visit to North Africa and Malta included the appointment of Major J. S. Richardson, MRCP, RAMC, to MVO (fourth class).

The King has given permission to Prof. Sydney Smith and Lieut.-Colonel F. A. F. Crew, FRS, to wear the order of Polonia Restituta (third class) which has been conferred on them by the President of the Republic of Poland.

Free Training for Occupational Therapy

Weaving, rug-making, knitting, basketry, toy-making and other handicrafts are now taught in hospitals as part of the rehabilitation of the sick and wounded. As there is a shortage of women instructors the Ministry of Health is offering, free of charge, short training courses which will qualify for salaried posts in hospitals. Applicants should have a knowledge of craft work, nursing or massage, or hold degrees in social science, comparative anatomy or psychology. Courses are also offered to women of school certificate standard without special qualifications, to act as auxiliaries. The first course will be held at the Dorset House school of occupational therapy, Barnsley Hall Emergency Hospital, Bromsgrove, Worcs, on July 19 and another on Sept. 13. Particulars from the principal at the school.

Concessions to Maternity

Besides a baby, the expectant mother after July 25 may expect rather more milk (7 pints priority as well as the non-priority allowance), more eggs (fewer in their shells and more dried) and an additional half meat-ration every week, as well as the same share of oranges, when there are any, as her children. Her allowance of vitamins is unchanged. The newborn baby can no longer hope for sweets or chocolates during his first six months of life, a blow which will fall less heavily on him than on his expectant siblings.

The process by which the mother comes by her extra rations has also been simplified. She will be entitled, as before, to 60 supplementary clothing coupons for herself and a clothing ration for her child as soon as he is born; but in future the Board of Trade will not insist that the pregnancy must have advanced beyond the fourth month before the certificate entitling the mother to clothing coupons can be accepted.

Medical Sickness, Annuity and Life Assurance Society

The annual meeting was held on June 28. Mr. R. J. McNeill Love, chairman of directors, said that the new business in the life assurance fund had increased from £141,000 to £267,000, and the total of this fund now stood at over one and a half million. All policies for life assurance effected since the outbreak of war bore an exclusion agreed upon by the Life Offices Association that in claims directly or indirectly due to the war the sum assured should not be paid, but the premiums should be returned. The words "indirectly due to war," however, had opened up such a wide field of conjecture and discussion that the directors had decided in principle *that claims directly due to enemy action* should follow the exclusion but that all other claims should be paid in full so far as the funds of the society allowed.

Speaking of the discussions now taking place on the Beveridge report, the chairman said that the proposed abolition of private practice as at present carried out and the transformation of doctors from the complete freedom they had always enjoyed to the restricted activities of salaried civil servants opened up a startling prospect. What was to happen, he asked, to the capital of thousands of doctors which had been invested in the purchase of a practice or a share in a partnership? Mr. McNeill Love and Surgeon Rear-Admiral C. P. G. Wakeley were re-elected directors.

Socialist Medical Association

Six lectures on industrial health are to be given at the London School of Hygiene, Keppel Street, W.C.1, at 6 PM on successive Wednesdays, beginning on July 21 when Dr. T. O. Garland will open the series with an historical introduction. The other lecturers are: Dr. Donald Stewart, housekeeping in the factories; Dr. E. L. Middleton, common hazards and their control; Dr. Hugh Faulkner, accidents and rehabilitation; Dr. R. S. F. Schilling, industrial medicine as a career; and Dr. Joan McMichael, organising for health on the job. Tickets in advance from the association, 33, Murray Road, Northwood, Msx.

Corrigendum.—In the obituary notice of Dr. N. A. Dyce Sharp (July 10, p. 60) allusion was made to his excellent research on microfilariæ, especially on the *little known* Agamofilaria streptocerca.

Appointments

BOWDLER, W. A., MRCS: examining factory surgeon for Coniston, Lancs.

EDWARDS, L. C., MB WALES: examining factory surgeon for Llanelly.

FISHER, J. A., MD, B SC BELF.: assistant in the Nuffield department of clinical medicine, Radcliffe Infirmary, Oxford.

JONES, W. W., MB LOND.: MO for silicosis and asbestosis scheme 1931 (Workmen's Compensation Acts).

Births, Marriages and Deaths

BIRTHS

DAWNAY.—On July 11, at Dorking, the wife of Captain Peter Dawnay, RAMC—a daughter.

EDELSTEN.—On July 4, at Bath, the wife of Major Alan Edelsten, RAMC—a son.

HAMILTON.—On July 5, at Bristol, the wife of Surgeon Lieut.-Commander S. G. Hamilton, RNVR—a son.

HARRIS.—On July 7, at Bath, the wife of Major G. A. Stocker Harris RAMC—a daughter.

KEELING.—On July 4, in London, the wife of Lieut.-Colonel Richard Keeling, RAMC—a son.

KIEFT.—On July 7, at Woking, the wife of Lieutenant B. T. Kieft, RAMC—a son.

PATTEN.—On July 1, at Ringwood, Hants, the wife of Lieutenant G. D. R. Patten, RAMC—a daughter.

SCATLIFF.—On June 26, at Hurstpierpoint, the wife of Dr. J. N. R. Scatliff—a son.

SMIBERT.—On July 9, at Woking, the wife of Captain Jame Smibert, RAMC—a daughter.

YOUNG.—On July 8, in London, the wife of Dr. A. W. O. Young—a daughter.

MARRIAGES

ALEXANDER—MENZIES.—On June 22, in Egypt, R. S. Alexander, Captain RAMC to Jean Menzies, QARNNSR.

BARRETT—BATCHELOR.—On June 25, in Edinburgh, Geoffrey Malcolm Barrett, MB, to Phyllis Eileen Batchelor.

DAVIES—HOWELL.—On July 10, at Llanishen, Ernest Llewelly Davies, MRCS, of Aberayron, to Nancy G. Howell, MRCS, o Llanelly and Cardiff.

NIBLOCK—IVATT.—On July 7, at Carshalton, Henry Baird Niblock lieutenant RCASC, to Florence Mary Ivatt, lieutenant RCAMC.

VLASTO—TAIT.—On July 2, in London, Philip Vlasto, BM, to Shei Bruce Tait.

WALKER—HOLLIDAY.—On July 9, at Northwood, Michael Walk MRCS, to Rosemary Holliday, WRNS.

WHITE—CALDWELL-SMITH.—On July 3, in London, Ronald Argy White, surgeon lieutenant RNVR, to Pamela Holman Caldwell Smith.

DEATHS

ADDISON-SCOTT.—On July 8, at Budleigh Salterton, Dev Duncan Gordon *Addison-Scott*, MB EDIN., *surgeon* capta RN retd.

COTTER.—On June 14, at Dun Locha, Douglas, County Cork, Hen Joseph Cotter, MC, MB NUI, aged 54.

JOWERS.—On July 8, Lancelot Emilius E. Jowers, FRCSE, aged 80.

MAYO.—On Saturday, July 3, at Maresfield, Sussex, Edmo Godfrey Mayo, MRCS.

MILLS.—On July 5, Jean Mills, LRCPE, of Clinton Crescent, Leonards-on-Sea.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.

DEHYDRATION*

NOAH MORRIS, M D GLASG, F R F P S, M R C P
PROFESSOR OF MATERIA MEDICA AND THERAPEUTICS IN THE UNIVERSITY OF GLASGOW; VISITING PHYSICIAN, STOBHILL HOSPITAL, GLASGOW

ALL chemical reactions in protoplasm take place in a watery medium and all living matter relies for its existence upon the integrity of a fluid environment. In the mammal the skin, by enclosing the tissues within a protective waterproof layer, has freed the organism from complete dependence on the external environment; but in so doing it has necessitated the careful regulation of the body fluids.

These we can divide into two fractions: (a) *intracellular water*, amounting to about 50% of the body-weight and forming an essential constituent of the protoplasm; and (b) *extracellular water*, about 25% of the body-weight, which may be again subdivided into two fractions, the vascular fraction contained within the blood-vessels, and the extravascular, interstitial or intercellular fluid. It is this latter moiety, amounting to about 20% of the body-weight, that forms what Claude Bernard called the *milieu interne*.

[illegible] eous environment [illegible] iemical conditions [illegible] osmotic pressure [illegible] by the characters and composition of the extracellular fluid. Claude Bernard, indeed, emphasised the importance of constancy in the characters of the internal environment as a prerequisite of the life of warm-blooded animals. This is readily appreciated when one remembers the effects that alterations in C_H, for example, produce in the rate of chemical changes.

The two aspects of water metabolism—first [illegible] composition and distribution of the body fluids.

INTAKE AND OUTPUT OF FLUID

The water content of the body is increased by ingestion of water, oxidation of foodstuffs and tissue metabolism. Water loss takes place by the skin, lungs, gastro-intestinal tract and kidneys. The function of the skin is essentially the regulation of body temperature, while the lungs are chiefly concerned with the intake of oxygen and output of carbon dioxide. The gastro-intestinal tract, while normally not wasting a large amount of fluid, requires a considerable quantity for the performance of its digestive functions. These must and do go on even when there is a shortage in the body itself. Thus there is secretion of gastric juice containing hydrochloric acid even though the blood chloride is considerably reduced, and there is a [illegible] water-vapour [illegible] Accordingly [illegible] not be called [illegible] even when the fluids of the body are being catastrophically depleted. The activity of the kidneys is, however, determined by disturbances of the internal [illegible] not be too much to say [illegible] and composition of the e[illegible] the functions of renal tiss[illegible] unit, with its unique power of elaborating a solution [illegible] n that of the blood [illegible] ied to conserve the [illegible] was not appreciated [illegible] uria associated with [illegible]-enteritis, attributed it to a toxic suppression of kidney function, whereas in fact the cause was an insufficiency of fluid.

The amount of water used daily by the healthy subject is relatively enormous. Thus the daily secretions and excretions require a fluid turnover of 4000 to 16,000 c.cm., all derived directly from the circulating plasma, the volume of which rarely exceeds 3000 c.cm. It is obvious that if an efficient circulation is to be maintained the volume of blood cannot vary greatly. Hence in order to furnish fluid for the normal secretions, the plasma must have available a large store of fluid from which it can quickly draw. This reserve is provided by the interstitial fluid of the body, while the capillary circulation with its relatively enormous surface area (according to Krogh 68,000 square feet) renders possible the rapid passage of fluid from interstitial spaces to blood-vessels and vice versa.

DISTRIBUTION WITHIN THE BODY

From these considerations it is clear that for efficient metabolic activity the distribution of fluid is just as important as the total amount, since water that is not available for use might as well not be there. Of the factors regulating the distribution of fluid within the body, two are of outstanding importance—namely, osmotic pressure and C_H.

Osmotic pressure within and without the cells must be identical, since any inequality would lead to the transference of water across the permeable cell-membrane. [illegible] gely the result of [illegible] us that changes in [illegible] of water. A study [illegible] tissue fluid and plasma shows that while sodium forms about 90% of the cation, chlorine forms about 70% of the acid electrolyte. Neither sodium nor chlorine passes through the cell-membrane; but, whereas [illegible] hich can replace sodium, chan[illegible] of chlorine—or indeed of an[illegible] compensated by alterations in [illegible] bicarbonate. Accordingly the concentration of total base, of which sodium forms the great bulk, is the factor which virtually determines the osmolar concentration of the plasma and tissue fluids. It is therefore obvious that the concentration of sodium in the extracellular fluid largely governs the percentage of water in the cells. One of the important functions of the kidney is to stabilise the [illegible] in the extracellular fluid. [illegible] ipaired in this respect the [illegible] r may be seriously upset, [illegible] extracellular fluid (dehydration) when too much sodium is lost, or to œdema when too much is retained.

The reaction of the body fluids depends ultimately on the ratio between free carbonic acid and sodium bicarbonate. The concentration of bicarbonate in turn [illegible] ase (virtually sodium) and [illegible] It is obvious that marked [illegible] of sodium and of chlorine will lead to alterations in C_H, as well as to changes in osmotic pressure. In order to minimise the changes in reaction, water passes from extracellular fluid to the cell or vice versa. If there is an increase of C_H, water passes from the interstitial fluids into the cells, whereas reduction of C_H causes a movement in the opposite direction.

CAUSES OF DEHYDRATION

Of the three fluid stores in the body, that contained in the extracellular extravascular compartment is the only one that shows a wide range of adjustability—a matter [illegible] nding the integrity of [illegible] may be produced in one of the [illegible]

(a) *Loss of water.*—Water may be lost in relatively greater amounts than sodium, as in profuse sweating. The percentage of sodium is much lower in the sweat than in the tissue fluids: hence the concentration of sodium in the tissue fluids rises, and through osmotic pressure changes the cells lose fluid. If large amounts of water are given the volume of the tissue fluids may rise to a normal level, but the sodium concentration and therefore the osmotic pressure is below normal because the salt lost in the sweat has not been replaced. Accordingly water will now pass from tissue fluid to cells.

(b) *Loss of* [illegible] aline or acid or both, [illegible] amount than water. [illegible] of base over acid, an acidosis results, while if more acid than base is lost an alkalosis is produced. In any case the interstitial fluid has a lower osmotic pressure than the intracellular with the result that water passes into the cells. Administration of fluid will remedy this state of affairs only if it contains enough of the appropriate electrolyte. If water alone is given it will lower the osmotic pressure of the interstitial fluid still further, cause a greater movement of water from tissue space to cell, and stimulate the kidneys to excrete as much water as possible in order to bring the osmotic pressure back to normal. This diuresis will, however, remove some electrolyte. Paradoxically, therefore, it is evident that the ingestion of water alone in such a case will aggravate the state of dehydration.

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* Based on a lecture delivered to the Royal Medico-Chirurgical Society of Glasgow.

(c) *Shock.*—In shock produced by trauma, toxins or anaphylactic reactions there is a sudden change in the permeability of the capillaries with the result that protein passes from plasma to the tissue fluids. This alters the osmotic equilibria between the various fluid compartments and leads to the manifestations of dehydration, although the total body water has not been significantly altered.

This has been demonstrated experimentally by D.C. Darrow. A dog was given an intraperitoneal injection of dextrose. When removed after several hours, this fluid contained a considerable amount of sodium and chlorine which had passed in from the blood-stream in order to equalise the osmotic pressures. Simultaneously there appeared all the signs of dehydration owing to disturbance in the distribution of body water resulting from the loss of electrolyte, despite the fact that there was probably more water in the body than at the beginning of the experiment.

RESULTS OF DEHYDRATION

Dehydration brings in its train effects which further aggravate the pathological condition. For some time the tissue fluids maintain the plasma-volume, but before long this also is reduced with consequent fall of blood-pressure and impairment of circulation. Finally, with dilatation and increased permeability of the capillaries, the serum protein leaks into the tissue spaces, and a condition of circulatory collapse or shock is produced. Considerable strain is also put on the intracellular water, with impairment of cellular structure and loss of tissue constituents such as potassium, phosphorus and nitrogenous derivatives. A net loss of potassium always accompanies severe states of dehydration. Finally renal function is impaired. It must always be remembered that a prime concern of the kidney is to maintain plasma-volume. When plasma-volume is reduced, the kidneys conserve as much as possible, even when the result is an accumulation of such metabolites as urea or a decreased plasma concentration of sodium.

The clinical manifestations of dehydration are important. The skin loses its elasticity; the tongue is dry and the eyes sunken. Often there is anorexia, nausea and vomiting, which of course aggravate the dehydration. Usually there is evidence of impaired circulation, such as reduction of blood-pressure, progressive enfeeblement of the pulse and oliguria. Usually, too, there is some disturbance of acid-base equilibrium, the nature of which depends on the type of electrolyte lost. This is well illustrated when fluid is lost through the gastro-intestinal tract.

The vomiting of pyloric obstruction, for example, leads to loss of fluid which contains sodium with a great excess of chlorine. Accordingly carbonic acid is retained in the body fluids to satisfy the demands of base, and an alkalosis is produced. The kidney promptly responds by excreting an alkaline urine with excess of sodium bicarbonate. If the alkalotic condition persists long enough the continued excretion of sodium causes too great a reduction in the osmolar concentration of plasma and tissue fluids. The osmotic pressure is more important than the pH and the kidneys conserve the sodium even although by so doing the alkalosis increases in intensity. Accordingly the urine now contains a relative excess of organic acids with the result that its reaction is acid while a state of intense alkalosis exists in the body. If now sodium chloride is supplied in sufficient amount the kidney can immediately return to its task of diminishing the alkalosis without running any risk of imperilling the osmotic pressure of the tissue fluids, and the urine becomes alkaline.

When intestinal secretions are lost in excess, sodium is the principal electrolyte lost. Accordingly an acidosis is produced with its consequent strain on the kidneys. Obviously the urine remains acid throughout, but, unless the store of sodium and fluid is replenished, the kidneys are incapable of meeting the demands made on them. Their situation grows worse when, through insufficiency of base, organic acids accumulate from the maloxidation of fats and the breakdown of cellular substance, resulting from anoxia and dehydration.

It is of interest to observe that over 100 years ago the pathology and treatment of this type of dehydration was understood. O'Shaughnessy (1831–32) stated that analysis of blood from a patient with cholera "shows in the first place the absence of a large proportion of water, secondly the corresponding preponderance of albumen, thirdly the presence of urea, fourth the absence of alkaline carbonate, fifth a great deficiency of saline materials." He then gave the indications of cure as, first, the restoration of blood to its natural specific gravity, and secondly, the restoration of its deficient saline materials.

With our present knowledge this advice could hardly be bettered and we may summarise the principles of treatment under three headings:

1. The water and electrolyte content of the body must be restored to within normal limits.
2. Any disturbance of acid-base equilibrium must be removed.
3. The tone of the peripheral circulation must be maintained, or if defective must be restored.

Before considering each of these objectives in detail it is well to emphasise two points: first, when a state of dehydration may be anticipated it is important to prevent it; and, secondly, dehydration is an emergency demanding urgent attention, being a rapidly progressive state which may lead to irreversible changes in the cells resulting in death, even though the dehydration has apparently been removed.

RESTORATION OF WATER AND ELECTROLYTE

Restoration is achieved by the administration 0·9% sodium-chloride solution. Only in relatively min degrees of dehydration, or as a prophylactic measur will oral or gastric administration suffice. If it is give by mouth care must be taken to prevent nausea an vomiting which may result not so much from an irritant effect of saline but rather from the irritabilit of the gastric mucosa in states of dehydration. Hyp dermoclysis may be used but in many instances t peripheral circulation is so defective that delay i absorption of the saline may be considerable. In infant and young children the intraperitoneal administration o fluid is often very satisfactory.

Intravenous route.—In severe dehydration the flui must be provided as speedily as possible and intravenou administration is generally the method of choice.

Harvey's discovery of the circulation of the bloo stimulated Robert Boyle, physicist, and Christophe Wren, architect and biologist, to make use of the vein for the administration of drugs. The history of blood transfusion dates from that time; but of more immediat interest is the fact that Thomas Latta, M.D., of Leith, after hearing of O'Shaughnessy's investigations into th chemical pathology of cholera, tried to restore the blo of a patient to its natural state by throwing a solution immediately into the circulation (Latta 18 The first subject was an aged female in whom all th usual remedies had been fully tried, without producin one good result. The clinical report is worth recallin

> "Having inserted a tube into the basilic vein, cautic and anxiously I watched the effects: ounce after ounce injected but no visible change was produced. Still pe I thought she began to breathe less laboriously, soon t sharpened features and sunken eyes and fallen jaw, pale cold, bearing the manifest impress of death's signet, began glow with returning animation: the pulse which had ceased, returned to the wrist: at first small and quick, degrees it became more and more distinct, fuller, slower a firmer and in the short space of half an hour, when six had been injected, she expressed in a firm voice that she

free from all uneasiness, actually became jocular and fancied all she needed was a little sleep her extremities were warm and every feature bore the aspect of comfort and health "

Intravenous therapy is commonplace nowadays but periodically everyone meets with unpleasant reactions even when the simplest solutions are being used. Great care must be taken that the solution is free of pyrogenic substances. The rate of administration is also important. Hyman and his colleagues (1941), following the early work of Matas and Hendon, have shown that the rapid intravenous injection of fluid may itself lead to serious and occasionally fatal sequelæ even when the fluid is composed of nothing stronger than normal sodium-chloride solution carefully prepared and free of pyrogen. A maximum rate of 1 c.cm. per minute is recommended as the upper limit for amounts exceeding 100 c cm

Amount of fluid to be given.—Difficulty is sometimes expressed as to the amount of salt solution requisite for any particular patient. As a general guide it may be stated that in serious dehydration about 30% of the sodium chloride has been lost. If the total extra-cellular fluid is reckoned as 25% of the body-weight this loss would be equivalent to about 75 c.cm. of fluid per kg. of body tissue or 35 c cm. per lb This would represent a first approximation of the amount of saline required for a patient with serious dehydration. It has been suggested that it is possible to budget with a greater degree of accuracy by determining the degree to which the plasma chloride has fallen below normal and estimating how much sodium chloride would be required to make good the deficiency in the body fluids. This, however, entails so many presumptions that to my mind it is hardly worth the labour.

Of more importance is it to remember that the special supply of water and electrolyte must not cease after one *injection of normal saline There may be a continued* drain on the tissue fluids—sometimes obvious, as with vomiting and diarrhœa, but sometimes concealed

One patient showed to an increasing degree signs and symptoms of alkalosis although there was no vomiting and a litre of saline had been given It transpired that her stomach was dilated and contained no less than 7 pints (4200 c cm) of fluid When this was removed and 2 litres of 0 9% NaCl given by continuous drip she immediately improved

Recent work on the postoperative state has shown that there may be a great loss of fluid by the sweat or through wound discharges. Thus it has been estimated that 1000 c cm of fluid may be lost in the four hours following operation and of this no less than 700 c cm. may come from the perspiration which is promoted by the extra blankets and hot water bottles. A very good indication of ample supply of fluid is the passage of not less than 1500 c cm. of urine per diem—i e., an amount which allows the kidneys to excrete the accumulated waste material without having to work to maximum [illegible] aution one avoids the risk [illegible] se of renal defect. Even [illegible] fixation of urinary specific gravity at 1010, 1500 c cm of fluid should permit the limination of all the katabolites likely to be formed in wenty-four hours.

RESTORATION OF ACID-BASE EQUILIBRIUM

It is important wherever possible to prevent the evelopment of acidosis or alkalosis. Infections, specially gastro-intestinal infections, are liable to ause dehydration and acidosis, particularly in infants nd young children Careful watch must be kept on atients with diabetes mellitus or cyclical vomiting, and iose with chronic interstitial nephritis are also potential indidates for acidosis Pyloric stenosis and upper testinal obstruction are common causes of alkalosis

Certain drugs are prone to produce disturbances of id-base balance unless precautionary measures are ken Salicylates by the mouth can and do lead to acidosis unless the patient is protected by a sufficiency [illegible] d application of methyl [illegible] n more dangerous Anæs- [illegible] m, are apt to damage the [illegible] be well stored with glycogen [illegible] fore the administration of a general anesthetic Long- [illegible] ntinued treatment with alkalis may and often does produce an alkalosis. this is particularly likely to happen in the presence of peptic ulcer in the adult or pyuria in the young child

Therapeutic indications can be readily appreciated.

(*a*) Whenever a drug such as sodium salicylate or sodium bicarbonate is responsible for the disturbance in acid-base equilibrium its administration should at once be stopped

(*b*) The production of acid katabolites in excess must be terminated. Thus, the presence of ketone bodies in the urine is always an indication for glucose administration, since abundance of carbohydrate is the best means of ensuring satisfactory oxidation of the keto acids. In cyclical vomiting or the ketosis of gastro enteritis this usually suffices so far as inhibiting ketone production is concerned In the diabetic, *insulin therapy is of course* essential. It is worth making the point that in the state [illegible] one need not worry about [illegible] therapy must be pushed [illegible] red It is wise to remember, however, that uncontrolled glycosuria might easily favour the development of dehydration and coma by increasing the volume of urine

(*c*) The excretion of any accumulated acid substances should be encouraged. This can be achieved by the provision of abundant water and alkali. It is particularly important whenever there is renal impairment

(*d*) Deficiency of acid or alkaline substance in the plasma and tissue fluids must be made good. For this purpose sodium chloride is equally valuable whatever the nature of the acid-base disturbance. The healthy kidney apparently possesses the ability to discard or retain sodium or chlorine as the situation demands When, however, renal function is defective it is wise to supply alkali associated with weak carbonic acid which is readily dealt with by the respiratory mechanism When kidney efficiency is much impaired, the controlled excretion of both acid and alkali may be so defective as to make adjustment of acid base equilibrium virtually impossible.

This was well illustrated by a patient of Dr Stanley Graham, a child of 8 years with advanced chronic interstitial nephritis who, requiring alkali to prevent uræmia, frequently developed alkalotic tetany after a few days' administration of sodium bicarbonate The alkalosis was easily remedied by the administration of the acid producing salt ammonium chloride, which just as swiftly precipitated uræmic acidosis

This case is a dramatic illustration of the fact that the [illegible] nables us to pass through life [illegible] water and salt content of the [illegible] of acid-base equilibrium.

RESTORATION OF PERIPHERAL CIRCULATION

In collapse of the peripheral circulation there is an increase in the size of the vascular bed, which becomes too big for the volume of the circulating blood. Naturally the interstitial fluid is called upon to make good the relative deficiency of plasma volume It is of the utmost importance, therefore, to replenish the fluid stores of the body. If this can be done before the state of the capillary walls deteriorates and allows the passage of protein from the plasma to the tissue spaces, sodium-chloride solution is usually sufficient to restore blood-volume and circulation If the permeability of the capillaries has become unduly great, a more viscous fluid such as plasma must be used

Stagnation of blood in the peripheral vessels inevitably leads to a state of anoxia and a great increase in the loss of body fluid. Until the circulation is effectively restored, steps must be taken to counter these pathological processes by warmth and the administration of oxygen Great care must be taken not to overdo the application of heat, since this would increase further loss of fluid by perspiration. It is necessary to emphasise the fact that cardiac stimulants such as digitalis, far from being of help, may be positively dangerous in states of shock. Neither sympathomimetic drugs nor posterior-pituitary extract have so far proved of any value

FLUIDS USED IN THE TREATMENT OF DEHYDRATION

The best and safest all purpose solution is a mixture of 0 9% sodium chloride and 5 or 10% glucose This is often tolerated orally, but if there is any gastro-intestinal disturbance intravenous administration is advisable. The purpose of the glucose is threefold: (1) to provide easily utilised energy-yielding material, since often the patient is starving; (2) to promote the oxidation of any keto-acids that may be present; and (3), most important of all, to promote diuresis and thus provide ample water for the kidneys to carry any katabolites. Administration of water or saline solution by mouth is followed by diuresis; but the water of intravenously injected saline is not readily excreted. Repeated infusion of saline often leads to the appearance of œdema, which if severe and prolonged might impair circulatory efficiency and lead to pulmonary congestion. This is prevented if glucose is given with the sodium chloride. Glucose-saline is inadvisable when for any reason the subcutaneous or intraperitoneal route has to be used. Glucose may be irritating to the tissues, affords too good a culture medium for any organisms and if present in the peritoneal cavity in hypertonic solution may actually withdraw fluid from the blood-vessels and tissue spaces.

Occasionally it may be necessary to supply readily available alkali. The percentage of chlorine in normal saline is greater than that in the tissue fluids, but if kidney function is normal there is no difficulty in removing this excess chlorine in order to free the sodium and replenish the depleted store of alkali. If, however, renal function is defective the excess chlorine is not so easily dealt with and the acidotic condition may be aggravated. Accordingly, whenever there is reason to suspect that acidosis has caused or been caused by impaired renal activity, it is well to use a solution yielding bicarbonate, since the excretion of excess carbonic acid is effected by the lungs.

For this purpose M/6 sodium lactate is particularly useful: the lactate is rapidly oxidised to carbonate, thus enabling the sodium to combine with the excess acid substances and carry them off to be excreted in the urine. In my experience the one indication for this solution is the uræmia of chronic interstitial nephritis. It may however be used for any other acidotic state if there is extreme urgency. It may be given with glucose. Sodium-bicarbonate solution is recommended by some physicians in a concentration of 5%. This, however, is not easy to prepare in sterile solution, and it is positively dangerous to mix it with glucose, since a toxic compound is formed.

When there is failure of the peripheral circulation all the above-mentioned solutions rapidly leave the blood-vessels and may water-log the tissues. In such a case plasma—or, better still, concentrated plasma—is indicated. Gum-acacia solution, 6%, had a great vogue after the last war, but clinical reports of toxic effects and experimental findings suggest that the use of acacia is not without danger.

In the treatment of dehydration it is well to remember that it may result from some disease which is readily susceptible to treatment or may be a manifestation of a much more serious condition. The prognosis will naturally depend on the associated pathological state. I can do no better than conclude with the words of Thomas Latta:

> "Some of my cases failed, which I attributed to one or other of the following causes—either the quantity (of fluid) injected was too small, or its effects were rendered abortive by extensive organic disease, or its application was too late."

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ANAEROBIC INFECTIONS OF WAR WOUNDS IN THE MIDDLE EAST

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(*Continued from p.* 66)

BACTERIOLOGY AND PATHOLOGY

Before describing the bacteriological and pathological investigations in detail it is essential to discuss in very general terms the incidence of the various types of infection under review. And at once it can be said that, apart from true gas gangrene, no very satisfactory figures are available or are likely to become so. The reason for this is not far to seek—anaerobic contaminations of wounds are at once so common, and of so little importance in themselves that even if it were practicable, it would be an unusually futile procedure to keep records of each and every case. For the sake of completeness figures will be given, but it must be clearly understood that, always excepting gas gangrene, these are the merest approximations.

The period covered is from the commencement of hostilities up to (but not including) the second battle of El Alamein. If the expedition to Greece and Crete is excluded, the campaigns in the Middle East from Sept. 3, 1939, to Oct. 22, 1942, are six in number—the conquest of Italian East Africa, the occupation of Syria, and, in the Western Desert, the advances of 1940–41 and 1941–42, the retreat to El Alamein in 1942, and the siege of Tobruk. The total numbers of wounded, British, Imperial and Allied, in these campaigns are shown in table I. It has not been possible to separate accurately the various phases of the fighting in the Western Desert, and the relevant figures for this theatre of war have been consolidated.

TABLE I—WOUNDED IN MIDDLE EAST FORCES
SEPT. 3, 1939, TO OCT. 22, 1942

Nationality	Western Desert	Syria	Italian E. Africa	Total
British and Imperial	28,319	1951	5749	36,019
Allies	949	457	274	1680
Total	29,268	2408	6023	37,699

Information about many of the casualties in thes campaigns is very scanty, and it is never as detailed a could be wished. But, apart from the siege of Tobruk the battles were all fought in wild and difficult countr many miles—sometimes many hundreds of miles—fro the hospital areas. Most of the casualties necessari occurred at rush periods, when there was little time an less facility for anything but the essential work of gettin the wounded fit enough to endure the long journe to the base. In such circumstances the many medica officers concerned are to be congratulated that clinica details are available at all.

For reasons shortly to be given, it seems probable tha some 30% of wounds sustained in the African and Syri theatres of war were contaminated with anaerobe of this 30% between 2·5% and 5% developed anaerob cellulitis—i.e., about 1% of all wounded. This figure very much an approximation: it is based partly on th known cases occurring in one general hospital througho the period under review, partly on the estimated rat between anaerobic cellulitis and gas gangrene in oth hospitals. (Both methods of calculation gave sub ally similar results.) The gas-gangrene figures are ba in part on the return of Army Form I 1241 and Supp ment MRC 201, largely on personal liaison with various medical officers, field medical units and gene hospitals concerned. Every case has been carefu scrutinised; and where there has been any doubt as to correctness of the diagnosis the clinician in charge been consulted, and if necessary the case deleted or category altered. In a small number of ins mainly prisoners of war and some wounded treat a general hospital shortly before the fall of Tobruk adequate follow-up has not been feasible; but on whole our information is fairly complete. In addit there is a small group of cases concerning whom all clinical and bacteriological findings are lacking, all that is known being that a diagnosis of gas gangrene was made; these number eleven—seven in East Africa, three in Syria and one in the Western Desert—and have not been included in the final figures.

There is also some evidence that gas gangrene may have been rather commoner in the Western Desert than is generally believed. In the Libyan campaigns of 1940–41 and 1941–42 the lines of evacuation were extremely lengthy, the battlefields spread over an enormous area. This, especially in the second campaign, meant great delay not only in the evacuation of the wounded to the base, but even in their receiving primary treatment in the field. On the other hand, in the fighting round Gazala during the opening phases of the summer campaign of 1942 nearly all casualties were evacuated to a general hospital at Tobruk within 21–18 hours of being wounded Yet the incidence of gas gangrene was much higher than before, with almost as many cases in three weeks' fighting as in three months of the previous campaign. These facts do at least suggest that in the earlier fighting in the Western Desert some of the wounded may have died of gas gangrene before medical aid could reach them. It is only fair to add that most medical officers and surgeons who had experience in Libya are firmly of the opinion that the number of such cases must have been very small indeed.

TABLE II—INCIDENCE OF GAS GANGRENE ACCORDING TO CAMPAIGNS

Campaign	Fatal cases	Recovered cases	Fate unknown	Total
East Africa	2	2	3	7
Syria	4	3	1	8
Libya, 1940–1	14	12	0	26
Libya, 1941–2	16	13	2	31
Libya, 1942	26	33	13	72
Tobruk	4	5	0	9
Others	7	4	0	11
Total . .	73	72	19	164

Note—The group of cases marked "Others" includes various accidents and casualties that could not well be included under the other headings

TABLE III—INCIDENCE OF GAS GANGRENE ACCORDING TO NATIONALITY

Nationality	Fatal cases	Recovered cases	Fate unknown	Total
British	39	39	14	92
Indian	3	2	2	7
South African	2	3	0	5
Australian	6	4	0	10
New Zealanders	5	8	1	14
Allies	3	3	0	6
's O W	15	13	2	30
Total	73	72	19	164

Briefly, up to Oct. 22, 1942, 164 cases of gas gangrene are known to have occurred. The more relevant facts oncerning these cases are set out in tables II and III. If from this total of 164 cases the 30 prisoner-of-war asualties are deducted, the incidence of gas gangrene mong the British, Imperial and Allied troops is 0·32% f all wounded, and approximately 1% of the wounded i whom anaerobic bacilli have been found. The bacteriological findings in the individual clinical nditions will now be described.

Simple Contamination

In the assessment of the anaerobic flora of the simple ntaminated wounds three sets of investigations are ailable.

i A series of 545 war wounds were examined throughout the riod under review, of these 219, or approximately 40%, lded anaerobic bacteria It can at once be said that this ure gives an incorrect idea of the general incidence of such ections, for many of these cultures had been sent to me ecifically for the identification of anaerobes known to be sent

ii In a series of 467 cases from one hospital (included to a go extent in series i) 18% of the wounds showed the sence of clostridia, but this figure must be regarded as almost certainly being too low, for the hospital in question was not strictly speaking a general one and dealt almost exclusively with a selected type of case.

iii Finally there is a much smaller series of 123 cases from another hospital, of which 37 contained anaerobes—an incidence of 30%.

Although the number of cases in this last group is small, and the casualties do not cover the whole period in question, it probably gives a very fair approximation of the actual incidence of anaerobes in war wounds in the Middle East The cases were quite unselected and included all types and degrees of injury.

There is little point in entering into a detailed analysis of the anaerobic flora of the simple contaminated wounds, but the findings in the entire collection of 259 positive cases are summarised in table IV

TABLE IV—ANAEROBIC BACTERIA ISOLATED FROM 259 WAR WOUNDS

Organism	Strains and %	Organism	Strains and %
Cl butyricum	89 (34)	*Cl tetanomorphum*	8 (3)
Cl tertium	121 (47)	*Cl septicum*	7 (3)
Cl welchii	61 (23)	*Cl bifermentans*	2 (0·7)
Cl sporogenes	52 (20)	*Cl hastiforme*	1 (0·3)
Cl tetani	17 (6)	Unidentified clostridia	34 (13)
Cl œdematiens	15 (5)	*F fusiformis*	2 (0·7)
Cl cochlearium	13 (5)	Anaerobic cocci	3 (1)
Cl. sphenoides	13 (5)		
Cl capitovale	11 (4)		

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e are among the most strictly anaerobic of the clostridia, and in the simpler wounds they probably find conditions suitable for their growth more rarely than the less exacting saccharolytic varieties. It is not very common to find more than one type of clostridium in any one wound: of the 259 cases 134 contained only one species, 67 two, 12 three, 13 four and 3 five The figure for the anaerobic cocci is likely to be too low, for the ease with which these organisms can be overlooked in mixed cultures was not fully appreciated until the study of these simple wounds was nearly completed.

The anaerobic bacteria usually disappear quite early from an uncomplicated wound. This is especially true of the non gelatinolytic butyric acid group; the more actively proteolytic strains such as *Cl sporogenes* remain somewhat longer. The one organism that may become difficult to dislodge has been *Cl. welchii*. This may persist, sometimes in apparently pure culture, usually with micrococci or coagulase-positive staphylococci for company, for a considerable time, and to some extent may delay healing.

Anaerobic Cellulitis

Only 17 cases of anaerobic cellulitis have been fully investigated. The findings are summarised in table V.

It will at once be seen that while the acceptedly pathogenic species—i e, the toxin-producers—do not

TABLE V—ANAEROBIC BACTERIA ISOLATED FROM 17 CASES OF ANAEROBIC CELLULITIS

Organism	Cases																	Total
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	

have to be present in this condition, in every case one of the actively proteolytic clostridia—*sporogenes*, *bifermentans*, *putrificum*, or *capitovale* has been present. It is not known whether this is an essential feature of this type of infection: it could well be a mere coincidence, for the series is extremely small; also, as we shall see, gas gangrene can undoubtedly occur in the absence of such bacteria. Nevertheless the point is probably worth further investigation.

Anaerobic Myositis

CLOSTRIDIAL MYOSITIS—GAS GANGRENE

Of the 164 known cases of gas gangrene a complete analysis of the anaerobic flora has been carried out in 146, and in addition 4 other cases have been partially investigated in other laboratories. In the figures given below, however, only the 146 cases of which I have personal knowledge have been included. In 13 of these either no clostridia or only non-pathogenic clostridia were found. The findings as regards the pathogenic anaerobes are summarised in table VI.

TABLE VI—PATHOGENIC ANAEROBIC BACTERIA FOUND IN 146 CASES OF GAS GANGRENE

Species	Cases			
	Fatal cases	Recovered cases	Fate unknown	Total and %
Cl. welchii ..	36	35	12	83 (56)
Cl. œdematiens ..	32	19	4	55 (37)
Cl. septicum ..	17	10	2	29 (19)
Cl. histolyticum ..	10	0	0	10 (6)
Cl. bifermentans ..	5	2	0	7 (4)
Cl. fallax ..	0	2	0	2 (1)
Cl. tetani ..	10	6	3	19 (13)
Streptococci ..	6	7	0	13 (9)

I do not propose to discuss the significance of these findings at this stage, but to go on to consider the incidence of the individual organisms in more detail.

(i) *Cl. welchii*.—Although in the Middle East *Cl. welchii* has been by far the commonest pathogen, indeed by far the commonest clostridium, to be isolated from cases of gas gangrene, it has never dominated the anaerobic flora as it did in similar infections in the last war. It has occurred in the same wound with all the other pathogens, but it is more usual to find it alone; on the other hand, it has been comparatively rare to find it as the sole clostridium. Eleven such cases are known, of which four died, five recovered, and the fate of two is unknown. The various combinations in which *Cl. welchii* has been identified are indicated in table VII.

TABLE VII—INCIDENCE OF *Cl. welchii* IN 146 CASES OF GAS GANGRENE

Organisms	Cases			
	Fatal	Recovered	Unknown	Total
Cl. welchii	16	25	9	50
Cl. welchii and *œdematiens*	8	7	1	16
Cl. welchii and *septicum*	4	2	2	8
Cl. welchii and *histolyticum*	3	0	0	3
Cl. welchii and *bifermentans* ..	2	0	0	2
Cl. welchii and *fallax*	0	1	0	1
Cl welchii, *œdematiens* & *septicum* ..	1	0	0	1
Cl. welchii, *œdematiens* & *bifermentans*	1	0	0	1
Cl. welchii, *septicum*, and *histolyticum*	1	0	0	1
Total	36	35	12	83

In 14 cases the toxigenic type of *Cl. welchii* has been determined—they were all of type A.

(ii) *Cl. œdematiens*.—This has been the second commonest pathogen isolated from these cases. In about half of these it has been the only toxigenic anaerobe present, but on only one occasion was it the sole clostridium. This patient recovered. The findings in respect of *Cl. œdematiens* are summarised in table VIII.

TABLE VIII—INCIDENCE OF *Cl. œdematiens* IN 146 CASES OF GAS GANGRENE

Organisms	Cases			
	Fatal	Recovered	Unknown	Total
Cl. œdematiens	13	9	3	25
Cl. œdematiens and *welchii*	8	7	1	16
Cl. œdematiens and *histolyticum* ..	3	0	0	3
Cl. œdematiens and *septicum* ..	5	2	0	7
Cl. œdematiens, *welchii*, and *septicum*	1	0	0	1
Cl. œdematiens, *welchii*, & *bifermentans*	1	0	0	1
Cl. œdematiens, *septicum* & *bifermentans*	1	1	0	2
Total	32	19	4	55

(iii) *Cl. septicum*.—This has been the third commonest of the toxigenic clostridia, but is a much rarer organism than either of the two species already mentioned. In the cases in the Middle East it has been uncommon to find it as the only pathogen present, while it has only once been the sole clostridium in the wound—this case recovered. Its occurrence and distribution are shown in table IX.

TABLE IX—INCIDENCE OF *Cl. septicum* IN 146 CASES OF GAS GANGRENE

Organisms	Cases			
	Fatal	Recovered	Unknown	Total
Cl. septicum	3	4	0	7
Cl. septicum and *welchii*	4	2	2	8
Cl. septicum and *œdematiens* ..	5	2	0	7
Cl. septicum and *histolyticum* ..	2	0	0	2
Cl. septicum [illegible]	0	1	0	1
Cl. septicum, [illegible]	1	0	0	1
Cl. septicum, [illegible]	1	0	0	1
Cl. septicum, [illegible] & *bifermentans*	1	1	0	2
Total	17	10	2	29

(iv) *Cl. histolyticum*.—On no occasion has *Cl. histolyticum*, the fourth commonest organism in the present series, been the sole anaerobe to be isolated from a wound; other clostridia, pathogenic or innocent, have always been found as well. No matter what other company it has kept, it has invariably been associated with death. The details are given in table X.

TABLE X—INCIDENCE OF *Cl. histolyticum* IN 146 CASES OF GAS GANGRENE

Organisms	Cases			
	Fatal	Recovered	Unknown	Total
Cl. histolyticum	1	0	0	1
Cl. histolyticum and *welchii* ..	3	0	0	3
Cl. histolyticum and *œdematiens* ..	3	0	0	3
Cl. histolyticum and *septicum* ..	2	0	0	2
Cl. histolyticum, *welchii* & *septicum* ..	1	0	0	1
Total	10	0	0	10

(v) *Cl. bifermentans*.—This has been found in seve cases; once by itself in pure culture; only two of thes seven strains, however, were sufficiently toxigenic to kil mice. The relevant details are set out in table XI.

TABLE XI—INCIDENCE OF *Cl. bifermentans* IN 146 CASES OF GAS GANGRENE

Organisms	Cases			
	Fatal	Recovered	Unknown	Total
Cl. bifermentans	1	0	0	1
Cl. bifermentans and *welchii*	2	0	0	2
Cl. bifermentans [illegible]	0	1	0	1
Cl. bifermentans, [illegible]	1	0	0	1
Cl. bifermentans, [illegible] *septicum*	1	1	0	2
Total	5	2	0	7

(vi) *Cl. fallax*.—The last and by far the rarest of t toxigenic anaerobes isolated from these cases has l *Cl. fallax*. This has been found twice, once in associat with non-pathogenic clostridia and once with *Cl. welc* (table XII).

(vii) *Other Clostridia*.—Besides these toxigenic orga isms there has usually been the most bewildering varie of other more truly saprophytic clostridia. It is not f that any useful purpose would be served by det

TABLE XII—INCIDENCE OF *Cl. fallax* IN 146 CASES OF GAS GANGRENE

Organisms	Cases			
	Fatal	Recovered	Unknown	Total
Cl. fallax	0	1	0	1
Cl. fallax and *welchii*	0	1	0	1
Total	0	2	0	2

and tabulating the various permutations and combinations in which these bacilli have been found, but table XIII *gives the crude figures of the total isolations.*

TABLE XIII—NON-PATHOGENIC ANAEROBIC BACTERIA FOUND IN 146 CASES OF GAS GANGRENE

Species	Cases			
	Fatal cases	Recovered cases	Fate unknown	Total and %
Cl. sporogenes .	28	19	7	54 (37)
Cl. tertium ..	16	23	6	45 (30)
Cl. putrificum ..	10	14	5	29 (19)
Unidentified ..	9	9	5	23 (16)
Cl. butyricum ..	9	9	2	20 (13)
Cl. cochlearium ..	10	3	1	14 (9)
Cl. capitovale ..	4	4	0	8 (5)
Cl. sphenoides ..	2	3	1	6 (3)
Cl. hastiforme ..	2	3	0	5 (3)
Cl. tetanomorphum	2	2	0	4 (2)

STREPTOCOCCAL MYOSITIS

It is impossible to give any accurate estimate of the incidence of this condition in the Middle East, for it was not recognised as a clinical entity until late in 1941. It certainly is not a common condition: from the autumn of 1941 to the autumn of 1942 it is improbable that many such infections were missed, for they were being specially and specifically watched for, yet in this period (a period, it should be remarked, of high casualties) only 19 cases are known. These have all been investigated bacteriologically, and the relevant findings are in table XIV.

TABLE XIV—BACTERIA ISOLATED IN 19 CASES OF ANAEROBIC STREPTOCOCCAL MYOSITIS

Organism	Cases																		
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*
Anaerobic strep. ..	+	+	0	0	+	0	+	0	+	+	+	+	+	+	+	+	+	+	+
Str. pyogenes	+	+	+	+	+	+	+	+	+	+	0	0	+	0	+	0	0	+	0
Str. viridans	0	0	+	0	0	0	0	0	0	0	+	0	0	0	0	+	0	?	+
Staph. pyogenes ..															0	0	+	?	0
Staph. albus.															+	0	+	?	+
Enterococci ..															0	+	0	?	0
Bact. coli ..															0	0	0	?	0
Prot. vulgaris															0	0	0	?	+
Ps. pyocyanea															0	0	0	?	0
Diphtheroids															0	0	0	?	0
Subtilis type															0	0	0	?	0

The aerobic organisms were in every way typical of their pecies and will not be discussed further here.

It will be seen that in 4 cases anaerobic streptococci were ot recovered ; in [illegible] inical picture an[illegible] iat this has been [illegible] n the part of the [illegible] these organisms. Unfortunately it has not always een possible to examine the anaerobic coccus in detail—has either died out before it could be obtained in pure ulture or has been lost in transit, for it is a difficult and acting organism to maintain in the laboratory. All e strains (11 in number) that have been fully investi[illegible]ted have been similar in type, and resembled the n-hæmolytic anaerobic streptococci classed as group A Prevot and by Lancefield and Hare.

It is noteworthy that this organism has never been und alone, but has always been associated with various pes of aerobic pyogenic cocci—*Str. pyogenes* 9 times, *. viridans* 3, and *Staph. pyogenes* 6.

It is probably because of this that there has been no nstant cause of death or consistent post-mortem picre. Of the 19 cases 5 have died, of hæmolytic streptococcal septicæmia, anaerobic streptococcal septicæmia, bronchopneumonia, toxic hepatitis and generalised toxæmia.

Microscopically, however, the muscle lesion is characteristic and resembles that of gas gangrene very closely. It consists essentially in an acute interstitial myositis with an extensive polymorphonuclear reaction. The muscle-fibres show varying degrees of degeneration, even in the same microscopic field. The continuity of the muscle tissue is broken up and between the bundles of fibres are numerous clefts filled by fibrinopurulent exudate. There may be small areas of hæmorrhage. It is noteworthy that while the bacteria are neither so numerous nor so obvious as in gas gangrene, the polymorphonuclear reaction is apparently more pronounced.

Other Infections

Postoperative Synergistic Gangrene.—I have carried out no laboratory investigations in the three cases recognised in the Middle East Forces.

Fusospirochætal Infection.—The very limited bacteriological data on this type of infection have already been given. There is nothing of interest or importance to add.

Tetanus.—These infections were described by Boyd and MacLennan (1942).

Discussion

From the findings on anaerobic clostridial myositis (gas gangrene) certain points arise that merit further discussion and inquiry.

ANAEROBIC SYNERGISM

While the chances of recovery from gas gangrene due to a single species of clostridium are reasonably good, they diminish rapidly when other pathogenic anaerobes are present. For instance, the fatality-rate of infections [illegible]

Cl. welchii, but it is none [illegible] *dematiens* infections alone hav[illegible], but along with other anaerobes one of 65%; the similar *figures for Cl. septicum are 42% and 70%.* It could be argued that the greater activity of the sulphonamide drugs against *Cl. welchii* may have influenced these findings; but this effect, if it does exist, has probably been slight, for, in practice, the action of these agents has been less than might have been anticipated from the published experimental work.

Of all the combinations of anaerobes those in which *Cl. histolyticum* has been involved have been the most dangerous. In the Middle East this organism has been found only in cases of gas gangrene, never in simple wounds or in anaerobic cellulitis; there have been ten such cases and all have been fatal. This may, of course, be due merely to the fact that *Cl. histolyticum* antitoxin is not yet included in the therapeutic polyvalent anti-gas-gangrene serum, and until a supply of this is available, the problem cannot very well be resolved. Here there is, however, another factor that should always be borne in mind.

Apart from *Cl. bifermentans* all the other histotoxic anaerobes are without obvious action on the native proteins; *Cl. histolyticum*, on the other hand, both in dead and in living tissue, has by far the most powerful proteolytic action of any of the clostridia. In these cases it may well be that it acts quite as much by aiding the nutrition and direct spread of other organisms as by the activity of its own exotoxin.

There is in fact some indirect evidence in support of *this thesis. Table* XIV *shows that in the fatal cases the* proteolytic clostridia tend to predominate; indeed, this effect is rather more pronounced than appears from the simple list of total isolations If the following organisms are accepted as proteolytic—*Cl. tetani*, *Cl. putrificum*, *Cl. histolyticum Cl. bifermentans*, *Cl. sporogenes*, *Cl. hastiforme*, and *Cl. capitovale*—then, out of 84 fatal cases 46 had proteolytic clostridia as part of the anaerobic flora; out of 63 cases which recovered the corresponding figure is 30. Of course, several other factors are involved here—the possibility of greater injury to tissue and more extensive soiling of the wound [illegible] be excluded—but in view of the relatively slow [illegible] these organisms in a wound as compared with the saccharolytic species it seems probable that these figures have significance and do indicate some adjuvant action.

These are not new facts or theories, but they have been rather forgotten in recent years. The whole problem of the synergistic action of the clostridia is one that merits and would readily lend itself to experimental investigation. From a practical point of view all that can be said at this stage is that the most smelly cases of gas gangrene are likely to prove the most dangerous.

NATURE AND ORIGIN OF THE ANAEROBIC FLORA

By far the greatest discrepancy between our findings and those recorded from other theatres of war has been in the incidence of *Cl. welchii*. Both relatively and absolutely *Cl. welchii* has been much less ubiquitous in the Middle East than in Europe, and this has been especially evident in the Western Desert (table xv).

TABLE XV—RELATIVE INCIDENCE OF *Cl. welchii*

Organism	Middle East (146 cases)		Western Desert (127 cases)	
	Isolations	%	Isolations	%
Cl. welchii ..	83	56	65	51
Cl. œdematiens ..	55	37	53	41
Cl. septicum ..	29	19	27	21

Furthermore, this rarity of *Cl. welchii* was most noticeable in the fighting in the open desert, less so in the few static or semi-static battles. Thus in the advance to Benghazi in 1940–41 out of a total of 26 cases of gas gangrene cultures were obtained from 23. From these *Cl. welchii* was isolated only 8 times, *œdematiens* 12 times and *septicum* 6. On the other hand, during the siege of Tobruk from 8 cases of gas gangrene *welchii* was isolated on every occasion, *œdematiens* twice and *septicum* not at all. Again, in the fighting round Gazala and before Tobruk in 1942 out of 18 cases that were examined bacteriologically *welchii* was found 14 times, *œdematiens* 5 times and *septicum* twice. There is, however, another factor than the obvious one of the soiling of the ground involved here. These "static" cases were evacuated to a hospital very close at hand and were treated early in the disease, quite possibly before a slow-growing and toxigenic rather than invasive organism like *Cl. œdematiens* could become very apparent.

Although *Cl. welchii* was a relatively rare organism it was still much the commonest single species found; presumably because of this it has been more usual to find it alone in a wound rather than in association with other pathogenic anaerobes, whereas the reverse is true of the less common members of the group (table xvi).

TABLE XVI—INCIDENCE OF PATHOGENIC ANAEROBES ALONE IN 145 CASES OF GAS GANGRENE

Organism	Found alone	With other pathogens	Total
Cl. welchii	50	33	83
Cl. œdematiens ..	25	30	55
Cl. septicum	7	22	29
Cl. histolyticum ..	1	9	10
Cl. bifermentans ..	1	6	7
Cl. fallax	1	1	2

These findings were thought sufficiently unusual to call for further investigation. The most obvious line of inquiry was the anaerobic flora of the soil and sand from the various widely scattered battlefields, and to this end a very large collection of soil samples ranging from Abyssinia to Syria, and from Benghazi to the Gulf of Suez was accumulated. Unfortunately, owing to the great volume of work that resulted from the examination of the war wounds themselves, it was found possible to examine thoroughly only those specimens obtained from the Western Desert. These numbered 91 and had been collected at fairly regular intervals from El Daba in the east to Benghazi in the west; to the south they extended from the coast to the Qattara Depression and the oases of Qara and Siwa. The results of this investigation are listed in table xvii.

TABLE XVII—ANAEROBIC FLORA OF 91 SPECIMENS OF SAND FROM THE WESTERN DESERT

Organism	Cultivated areas 26 samples	Unsoiled desert 41 samples	Soiled desert 24 samples	Total
Cl. welchii	22	1	6	29
Cl. œdematiens ..	8	1	0	9
Cl. septicum ..	4	0	0	4
Cl. tetani	6	1	1	8
Cl. histolyticum ..	0	0	1	1
Cl. bifermentans ..	0	0	0	0
Cl. fallax	0	0	0	0
Cl. sporogenes ..	16	2	8	26
Cl. putrificum ..	3	1	0	4
Cl. capitovale ..	1	0	0	1
Cl. hastiforme ..	0	0	0	0
Cl. cochlearium ..	5	0	1	6
Cl. tertium	9	0	3	12
Cl. butyricum ..	8	1	2	11
Cl. sphenoides ..	2	0	1	3
Cl. tetanomorphum ..	1	0	2	3
Cl. caloritolerans ..	0	1	0	1
Unidentified species	7	2	4	13

Note.—Specimens obtained from towns and villages in Libya have been included under "cultivated areas." The term "soiled desert" refers to specimens from the desert roads and tracks and from the sites of encampments still or recently occupied.

The findings in the samples of sand or sandy soil obtained from the town and agricultural areas differ in no important respect from those published for similar terrain in other parts of the world: those from the desert differ very markedly.

The untouched desert appears to have an entirely negligible anaerobic flora, and for practical purposes may be regarded as being without pathogenic anaerobes Only three strains of toxigenic clostridia were found, and of these two (*Cl. œdematiens* and *tetani*) were isolated from a single sample of sand collected during a dust-storm near El Daba. But what is more noteworthy is that the soiled desert also has an extremely limited anaerobic flora, even in sites (such as some Italian camps near Sidi Barrani) which have been occupied in considerable squalor for several months. As a result of these findings some very limited experiments were undertaken to determine the viability of certain clostridia in the desert.

Two strains each of *Cl. welchii, œdematiens, septicum* and *sporogenes* were grown in nutrient broth for 48 hours and then added in 5 c.cm. amounts to 50 grammes of sterile sand in sterile glass containers. For each organism ten separat tests were put up (five for each strain). The inoculated san was then left exposed to the sun (care being taken to exclud contamination) and samples taken for culture on the 1s 7th, 14th, 28th, 56th, and 84th day. The findings ar summarised in table xviii.

TABLE XVIII—VIABILITY OF CERTAIN CLOSTRIDIA IN DESE SAND

Organism	Number of specimens positive in culture					
	1 day	7 days	14 days	28 days	56 days	84 day
Cl. welchii	10	7	0	0	0	0
Cl. œdematiens ..	10	10	10	10	10	10
Cl. septicum	10	9	10	9	9	9
Cl. sporogenes ..	10	10	10	10	10	10

When *Cl. welchii* was grown in alkaline egg broth thereafter added to the sand in similar amounts and tested under similar conditions it survived in nine out of the samples.

Similar experiments were next made using fæces in w *Cl. welchii* was known to be present. Approximately 1 g the undried fæces was emulsified in 10 c.cm. of sterile sal and added to the sand as before. Under these c *Cl. welchii* survived consistently for a fortnight but was recovered thereafter.

These experiments are too few and too crude to much significance, for throughout the period in qu there was rarely the time or the apparatus to spare work of this nature. However, there can be no do concerning the paucity of the anaerobic flora in the W ern Desert, and the source of the infection in almo third of all war wounds had clearly to be sought where. The next most obvious reservoir was clothes.

Twenty-five suits of battledress and twenty five sets of khaki drill shirts and shorts were obtained from wounded men newly arrived from Libya. Small pieces of cloth were cut from each garment, incubated for 48 hours in Robertson's cooked meat medium and then examined for the presence of clostridia. The findings from these 100 cultures are given in table XIX.

Experiments similar to those detailed in the case of desert sand were also carried out with pieces of uniform cloth. These were soaked in 18-hour broth cultures of the various test anaerobes and then exposed to the sun in petri dishes. It was found that *Cl. welchii* would survive slightly longer in cloth (14 days, very occasionally 28) than in sand, but would not remain viable indefinitely as *œdematiens*, *septicum*, and *sporogenes* would.

Limited though these experiments undoubtedly are, they probably furnish some indication of the mechanisms of infection in the Middle East.

TABLE XIX—ANAEROBIC BACTERIA ISOLATED FROM SERVICE DRESS

Organism	Battledress (25 suits)		Khaki drill (25 suits)		Total
	Tunics	Trousers	Shirts	Shorts	
Cl welchii . .	0	11	2	10	29
Cl œdematiens	0	1	0	0	1
Cl septicum	0	0	0	1	1
Cl histolyticum .	0	0	0	0	0
Cl. bifermentans . .	0	0	1	0	1
Cl fallax . .	0	0	0	0	0
Cl. sporogenes	4	7	5	9	25
Other clostridia .	11	12	8	6	37
Total	21	31	16	26	94

From its very immensity it is unlikely that the soiling of the desert, even on the scale of the last three years, has had much influence on the anaerobic flora of war wounds in the Middle East; but even if this has been a factor *Cl. welchii* has almost certainly not been involved, for it can survive the heat and desiccation only for a short time. The main source of infection appears to be in the clothing of the fighting man; and here, although the physical conditions still militate to some extent against the persistence of *Cl. welchii*, the anaerobic flora approaches more closely to that found in the battlefields of Western Europe, for there is almost daily contamination with the richest of all anaerobic material—fæces.

DIAGNOSIS

As a rule there should be little difficulty in recognising and distinguishing the various types of anaerobic infection; anaerobic cellulitis and the two varieties of anaerobic myositis may, however, be occasionally confused, and for this reason the more important points of differentiation have been listed in table XX. But tabulations such as this inevitably involve dogmatic [illegible] e and [illegible] is at [illegible] he information [illegible] these cases [illegible] f a muscle smear stained by Gram's method. Occasionally this may be the only means by which an early gas gangrene can be certainly differentiated from streptococcal myositis.

In gas gangrene such smears usually show an abundant and diverse bacterial flora with large gram-positive rods [illegible] scanty and degenerate. [illegible] also may be scanty, but [illegible] found if searched for with [illegible] are. In streptococcal myositis the picture is more constant and even more typical. No gram-positive bacilli are to be seen, but in their place enormous numbers of streptococci occur among masses of pus cells. (It is worth bearing in mind that the anaerobic streptococci are on the whole of much smaller size than the common aerobic types). It will of course be obvious that if non-pathogenic clostridia or aerobic spore-bearers were present the immediate diagnosis by this method might be extremely difficult if not impossible; for streptococci are quite frequently to be found in true cases of gas gangrene. In such circumstances the great preponderance of streptococci and the large numbers of pus cells would probably prove of assistance · fortunately such cases have not yet occurred, or at least have not yet been recognised.

TABLE XX—DIFFERENTIATION OF ANAEROBIC CELLULITIS AND MYOSITIS

—	Anaerobic cellulitis	Gas gangrene	Strept myositis
Incubation	Almost always over 3 days	Usually under 3 days	3–4 days
Onset	Gradual	Acute	Subacute or insidious
Toxæmia	Nil or slight	Very severe	Severe only after some time
Pain	Absent	Severe	Variable, as a rule fairly severe
Swelling	Nil or slight	Marked	Marked
Skin	Little change	Tense, often very white	Tense, often with coppery tinge
Exudate	Nil or slight	Variable may be profuse serous	Very profuse, sero purulent
Gas	Abundant	Rarely pronounced except terminally	Very slight
Smell	Foul	Variable, may be slight	Very slight
Muscle	No change	Marked change	At first little but œdema

The recently described tests for the production in war wounds of lecithinases and hyaluronidases have not as yet been given a clinical trial in the Middle East, but arrangements have now been made for the investigation in the field of their usefulness in the early and accurate identification of the various pathogenic clostridia.

(*To be concluded*)

SERIAL SEDIMENTIN INDICES

A MEASURE OF PROGRESS IN PULMONARY TUBERCULOSIS

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By far the most commonly used method of measuring blood sedimentation today is Westergren's,[1] or some modification thereof, in which is measured in millimetres the distance fallen by the upper corpuscular limit in a 100 mm. or 200 mm. column of citrated blood at the end of one or two hours The modifications involve the use of columns of different height and diameter and different lengths of time, but the principle is always the same: measuring distance fallen in a given time. Cutler [2] describes a method in which the distance fallen in a 60 mm. column of blood is noted every few minutes during the act of sedimentation, and these distances are plotted against time graphically In the resultant curves he recognises certain characteristics, but extracts no numerical value from them This method therefore cannot be used for measurement

After experimenting along similar lines, I worked out a method which involves plotting the "Cutler's curves" described by a sedimenting 200 mm column of citrated blood, and ascertaining the logarithm of the maximum constant velocity achieved during the fall, and I showed empirically that this figure is directly proportional to the concentration of those substances in the blood which cause corpuscular agglutination [3] These substances I called "sedimentin" for convenience; and later [4] I propounded a standard technique in which the "sedimentin index" of a citrated blood sample is expressed in "units" as the logarithm of its maximum constant velocity per 100 minutes I urged that this was the

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1 Westergren A *Acta med scand* 1921, 54, 247
2 Cutler, J W *Amer Rev Tuberc* 1929, 19, 544
3 *Tubercle*, 1939, 20 346
4 *Lancet*, 1940, i, 1160

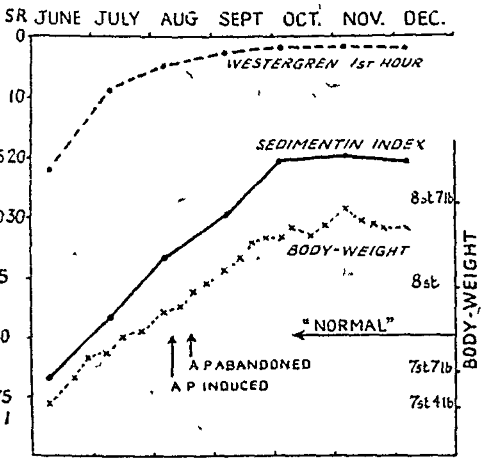
only scale by which could be made a definite measurement in standard units of the "sedimentin" which manifests itself in the blood of patients suffering from destructive disease processes. The Westergren readings, in contrast, were found to bear no ascertainable relationship to the sedimentin content.

For the past four years every patient at Mundesley Sanatorium has had his sedimentin index determined at least once a month, and the "units" measured have been recorded on his "progress chart." These progress charts are merely ordinary temperature charts recalibrated so that each major column represents a month instead of a day, and the four subdivisions in each major column represent weeks in the month. On them are recorded the sedimentin index (taken during first week of month and sometimes repeated later in the month), the Westergren first-hour reading (taken at the same times), and the patient's body-weight (recorded weekly). Operations, special treatments and the development of complications whenever obvious are recorded as they occur. In this way each progress chart gives a condensed bird's-eye view of a patient's illness while under treatment.

The following progress charts have been selected from some 350 because they are those of cases whose clinical progress was either steady and uninterrupted, or was markedly affected by some change in treatment or by the development of some indisputable complication or extension of the disease. It will be seen how faithfully the serial sedimentin indices reflect the course of the different patients' progress.

CASE 1

A married woman, who had had 6 months of sanatorium treatment in 1932, returned in 1940, having kept perfectly well and led a normal life, playing much golf, during the intervening years until the outbreak of war. Her home was broken up when her husband joined his régiment, and she became a "camp-follower," making exhausting journeys and living in different hotels until her health broke down. Recognising her symptoms, she had her chest examined radiologically, when it was found that at one apex, adjacent to an apparently healed lesion (which had not altered since her discharge 9 years previously), was a fresh patch of infiltration the size of a thumb-nail. She was treated with absolute rest in bed for 2½ months, after which she took graduated exercise until, at her discharge, she was up and about all day and walking 4–5 miles. During all this time she made steady uninterrupted progress. She more than regained her lost body-weight, and the patch of fresh infiltration slowly shrank and faded away. A shallow artificial pneumothorax was attempted in her second month, but as it proved hopelessly contra-selective it was abandoned after the fourth refill, not having made the slightest alteration in her clinical condition.



CASE I

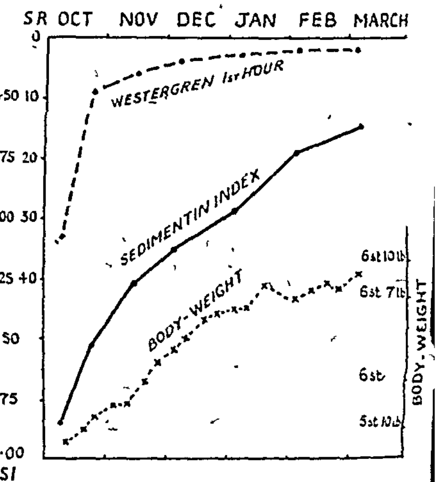
SI = Sedimentin index (units).
SR = Sedimentation-rate (mm. in 1 hour).

On the progress chart it will be seen that the sedimentin index improved steadily at the rate of 0·22 unit per month until it was as low as 0·80 unit, where it settled. This figure we decided was probably in the neighbourhood of this patient's "normal" index, and this supposition was confirmed when she came for a further reassuring "overhaul" in perfect health 5 months later when her SI was found to be 0·85 unit. Again, a year later, it was 0·83 unit.

The Westergren first-hour readings do not show such a steady diminution. By their scale the patient improved more in the first month (11 mm.) than in all the subsequent months put together (7 mm.). Also the improvement shown during the months August-September-October (5 mm. to 3 mm. to 2 mm.) would not encourage one to believe that much had been achieved during that time. It might be pointed out—without comment—that some writers are prepared to accept any figure up to and including 12 mm. as the "normal" healthy woman's first-hour Westergren reading.

CASE 2

A boy, aged 11 years, was found on admission to have a left-sided pleural effusion without any ascertainable intrapulmonary lesions. A small sample of his fluid had been aspirated before admission and found typical of tuberculous effusion. In the sanatorium he showed an evening temperature just short of 99° F., but by the end of 4 weeks it was normal. His treatment consisted at first of absolute rest in bed and a course of ultraviolet irradiations, and later of graduated exercise. Clinically his improvement was continuous, and radiological screen examinations from time to time showed a progressive diminution in the size of his effusion, until at the time of his discharge it was a thin loculated film. His body-weight increased steadily until the latter part of the fourth month, when his walking exercise was extended considerably, and he worked off some of his fat.



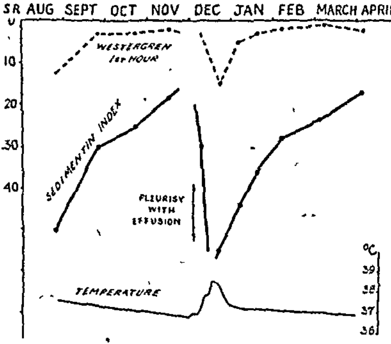
CASE 2

On the progress chart it will be seen that the Westergren first-hour reading diminished rapidly from 33 mm. to 9 mm. in a fortnight, and within a further few weeks it was so low that differential readings can scarcely be distinguished. If one judged by these figures one would say that very little alteration, if any, took place in the patient's condition during his last 3 months of treatment. The sedimentin index describes a much flatter curve—almost a straight line, in fact—and demonstrates as definite an improvement in the later weeks as it does in the earlier. Month by month the patient improved clinically, and this course is more faithfully reflected by the index than by the first-hour reading. It would be fair, too, to say of this convalescence that the patient showed an average improvement of 0·24 unit per month. The Westergren measurement did not improve so steadily and from it no monthly average can be usefully calculated. This patient (like most) went home before hi "normal" index could be ascertained.

CASE 3

A man, aged 37, a month before admission developed a acute right-sided pleurisy with effusion, which when partiall aspirated revealed acute caseating disease in the right middl lobe. On admission very little fluid remained. An artific pneumothorax was immediately induced and proved select and thenceforward the cavity steadily diminished in si The left lung was clinically and radiologically disease-fr and remained so throughout. By the end of 3 months th patient's temperature had fallen to a normal range, and had reached the stage of being out of bed for 4 hours walking half a mile daily. Then came a sudden attack pleurisy with considerable constitutional upset and reappearance of a large effusion in the pneumothorax. temperature rise was spread over 5 days, and was followed a fall which lasted 5 weeks before it finally resumed its nor level. Fluid was withdrawn at the end of this period, a shortly afterwards the patient was allowed to embark on graduated exercise. The remainder of his progress steady and uninterrupted. Just before he left the sanato the residue of his effusion was removed.

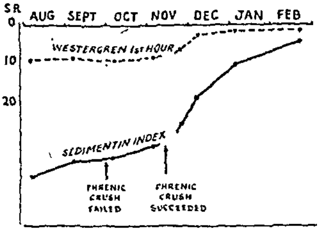
In this case, as in the preceding ones, the sedimentin index shows a more uniform progression, and reflects the clinical course more faithfully than the first-hour reading. During the first 3 months of treatment, up to within 3 weeks of the "pleural relapse," the patient's progress was steady, and his SI improved steadily from 1·50 units to 0·70 unit, with an average improvement of 0·20 unit per month; but during the second and third month the Westergren reading barely altered. During the next 3 weeks the index may have improved further; of that we have no record. But 2 days after the rise of temperature, even before signs of pleurisy had shown themselves, the index had risen abruptly to 1·00 units, whereas the Westergren reading had only increased from 2 mm. to 3 mm. A week later, when the temperature had passed its peak, the SI was 1·63 units. It may have reached a greater height, which I missed recording, and was now already on the down grade. When the acute stage was over, the index fell steadily until the patient's discharge. Its average rate of improvement was 0·27 unit per month—practically the same as in the first 3 months.



CASE 3

CASE 4

A male law-student, aged 24, was admitted with a cavity in his right lung, and no other disease apparent elsewhere. An artificial pneumothorax was induced immediately, but with little effect on the cavity. The adhesions were not suitable for cauterisation, so it was decided to crush his right phrenic nerve. The main nerve was very thin, and the first operation on Oct. 1 did not make the slightest difference to the position or movement of his diaphragm, or to his clinical progress. On Nov. 11 the operation was repeated, and every accessory twig was located and crushed. This time it was successful: it allowed the diaphragm to rise and to move paradoxically, thus releasing the tension downward from the diseased area. The cavity, now relaxed, [illegible] getting out of bed and to embark on progressive exercise. He was soon well enough to go home.



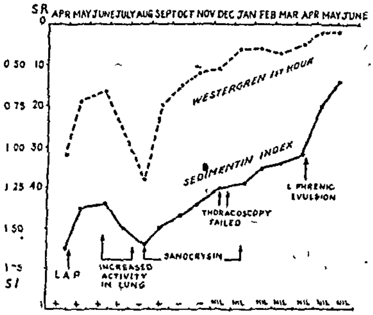
CASE 4

In this case the turning-point—i.e., the successful operation—the average rate of improvement was 0·18 unit a month—three times as fast.

CASE 5

An engineering student, aged 22, was admitted with cough and TB positive sputum. Clinically and radiologically he had a large cavity surrounded by infiltrative disease in the upper half of his left lung. In the middle zone of his right lung there were some extremely dubious signs suggestive of infiltration. A left-sided artificial pneumothorax relaxed the diseased area, which soon showed signs of clearing, but it did not allow the cavity to close because of adhesions. At the end of 6 weeks, when the adhesions were due for exploration, indubitable signs of increasing activity appeared in the right middle zone, so the thoracoscopy had to be postponed. Instead, when the pyrexia had settled, a long course of intravenous 'Sanocrysin' was started. By November the patient's general condition seemed sufficiently improved for thoracoscopy, which was performed in two stages. At the second operation the remaining apical adhesions were found to be unassailable, so the cavity-containing area had to remain strung between the subclavian vessels and the diaphragm. The patient's general condition continued to improve, and he was sputum-free. A small cavity persisted, so a phrenic evulsion was performed in April, and soon after the diaphragm had taken up its new position the cavity completely disappeared.

When we compare the sequence of events in this case with progress as recorded by the SI and first-hour curves, several points emerge. The deterioration following the activation of disease in the contralateral lung is represented more moderately by the SI than by the first-hour reading. The improvement after the inauguration of sanocrysin injections from August to April is much more regular in the SI curve, which averages an improvement of 0·07 unit a month, than in the first-hour reading, which shows more improvement in the first month than it does in the next half-year. The unsuccessful operation of thoracoscopy made no alteration to the tendencies of either curve. The phrenic evulsion was followed by dramatic improvement in the next 2 months' SI, which does not show in the first-hour curve. Indeed, judging by the SI curve, it seems a pity that the phrenic evulsion was not performed months earlier.



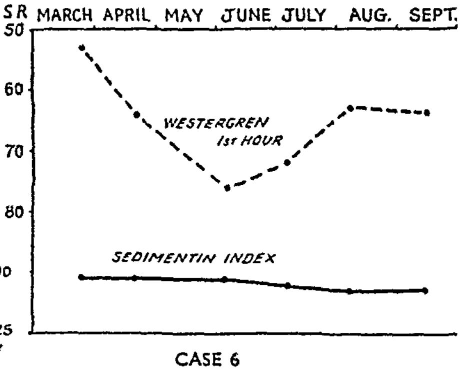
CASE 5

Ideally, at this juncture, it would be desirable to demonstrate some cases showing how the SI behaves when there is *steady and progressive deterioration*; but such cases are much rarer even than those showing

ward path is lit by a "flare-up," big or small, and is separated from the next by a lull, during which there seems to be an attempt to arrest the disease. In such cases the blood-sedimentation rate, however measured, describes a zigzag course. I have however managed to find one case where there appeared to be no resistance to the disease process.

CASE 6

stages of the disease. She was found to have extensive bilateral caseating disease, for which no specialised form of treatment was conceivable. She lay in bed and deteriorated steadily both clinically and radiologically. At no time was there a vestige of improvement nor were there any clinical signs of a "flare-up." She was a dying woman on admission.



CASE 6

This course is reflected in the behaviour of her SI; high on admission, it remained high to the end, and described an almost straight line on her progress chart. It is noteworthy that the first-hour reading, although high, pursued a course of its own regardless of the clinical course of the disease. In fact, in July and August it recorded a well-marked improvement.

DISCUSSION

These cases were chosen because the clinical progress of each was simple and clear-cut. Cases 1 and 2 showed straightforward convalescence from sickness to health. Cases 3, 4 and 5 had incidents in their careers which were clinically indisputable—operations, such as the phrenic interruptions that were obtained in cases 4 and 5, a course of sanocrysin injections in case 5, an attack of pleurisy with effusion in case 3 and an increase of active disease in the uncontrolled lung in case 5. Case 6 was one of "slow death."

In cases 1 and 2, where progress was uninterrupted, the SI reflected this course and diminished by approximately equal amounts each month; whereas the Westergren first-hour reading diminished rapidly at first and more slowly later; in the last few weeks there was little perceptible change in the first-hour reading. In cases 3, 4 and 5 both measurements were affected by the clinical incidents, but the most marked change in direction in each case was shown by the SI curve. Indeed, the first-hour reading was practically unaffected by the phrenic evulsion in case 5. In case 6 ("slow death"), the SI showed a slight but steady increase up to the end; the first-hour reading actually showed an improvement in the third month and maintained it thereafter, a fact which impugns the reliability of this mode of measurement.

From these observations it appears that in an uncomplicated case of pulmonary tuberculosis the alteration in the serial sedimentin indices may be taken not only as indicating the direction of the patient's progress but as a measurement of his rate of progress from sickness to health or vice versa; and that the amount of sedimentin in the blood is a measurement of the severity of his destructive disease processes. The implications of this thesis are too wide and far-reaching to be more than enumerated in this short article. If it be true, it follows that diagnosis can be helped in cases under observation, especially those in which suspicion of preclinical tuberculosis has been raised during mass-radiological surveys. The progress of cases under treatment can be assessed from month to month, and warning received when complications or extensions of disease have occurred or are occurring insidiously. The efficacy of any "special" line of treatment, be it collapse therapy, chemotherapy or graduated exercise, can be checked soon after its inauguration and continued or abandoned accordingly in any individual case; it can also be assessed by comparing the average progress rate of a group of patients so treated with that of a control group. Finally, the well-being of the patient after discharge can be checked (as in case 1) and will be assured if the SI is no more than it was at the end of treatment.

SUMMARY

Six cases of pulmonary and pleural tuberculosis onstrate how faithfully serial sedimentin indices reflect the clinical course of the disease. In cases making an uninterrupted recovery the sedimentin index diminishes by roughly equal amounts each month until a "normal" index is reached. This allows an average decrease in units of sedimentin per month to be calculated, and the figure obtained can then be regarded as the patient's progress rate.

SUPERSATURATED SULPHATHIAZOLE SOLUTIONS FOR LOCAL APPLICATION

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Sulphathiazole is soluble only to the extent of about one part in 2500 in water at room temperature, and the sodium salt, whose solubility is about one in 3, gives too alkaline a solution (pH 9–10) to be suitable for application to open wounds or sensitive mucous membranes. Lowering the pH of the solution of sodium salt by adding hydrochloric acid, which has been recommended, is unsatisfactory because free sulphathiazole crystallises out before the pH has fallen to 8·0. A neutral supersaturated solution of sulphathiazole with a concentration up to 1% may be prepared in the following way.

A 0·7 molar sodium phosphate buffer with pH 6·6–6·8 is prepared and sterilised in 5 c.cm. vials. The contents of one of these vials diluted with 45 c.cm. of hot sterile (or boiled) distilled water yields an approximately isotonic phosphate solution (solution A). Solution B is prepared by diluting the contents of a 5 c.cm. vial of injectable 'Cibazol' (20% sodium sulphathiazole) in either 45 or 95 parts of sterile (or boiled) distilled water. The final solution is prepared by measuring into a recently boiled container, while it is still hot, one volume of hot solution A and an equal volume of solution B, which need not be heated. The concentration of free sulphathiazole will be either 1% or 0·5%,* according to the dilution chosen for solution B. The acidity of the phosphate solution balances the alkalinity of the sodium sulphathiazole so that the final mixture is approximately neutral—pH 7·4, like the body fluids.

Provided the containers are clean and drying at the edges is prevented, no precipitation will take place in this solution until the temperature falls below 40° C., but the solution is highly supersaturated, and the addition of a small crystal of sulphathiazole will start rapid crystallisation. If no crystals reach the solution crystallisation will begin when it is cooled below 40° C., but will take place slowly; 15–30 minutes will elapse before all the sulphathiazole is precipitated. As this happens the solutio becomes more alkaline, from precipitation of the aci sulphathiazole radicals, but the pH will not rise abov 8·2–8·4. If clean and warm containers are used for it preparation there will be plenty of time for such a solution to be applied and to exert a strong local action, sinc its concentration will be 50–100 times that usually re in the blood after administration of sulphathiazole mouth. As the solution cools down in an infected cavit crystals will presumably be deposited on its surface, that the antiseptic action will continue, albeit reduced intensity. All the glassware to be used preparing these solutions must be first washed in wat made slightly alkaline with sodium hydroxide and the freely rinsed in tap water. This will remove any crystal which might produce premature crystallisation.

So far I have been unable to test the supersaturate solution clinically, except as a spray in a few cases subacute sinusitis, where it seemed to work well. I ha however satisfied myself by personal experience that it not irritating to the mucous membrane of the nose urethra.

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* When sulphathiazole is dissolved in plain water it produ a faintly acid solution. The solubility is increased by warmth by keeping the solution faintly alkaline with a phosphate thus the solubility in water at 16·5° C. is 36 mg. per 100 c.cm., that water at 37° C. is 96 mg. per 100 c.cm., while that in phospha buffer, pH 7·5, is 190 mg. per 100 c.cm. Accordingly when Dr. Loureiro's 0 5 or 1 0% preparations are cooled to 37° C. they contain approximately 2½ or 5 times as much sulphathiazole as be maintained permanently in simple solution.—Ed. L.

From the School Reports.—In a brief summary (T June 26, p. 820) we should have explained that the 4 evacuees in *Northampton* were in addition to local scholars. *Kettering* there were 4200 school-children, not 42,000 as stat

GENERALISED VACCINIAL REACTIONS IN ALLERGIC SUBJECTS

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In an authoritative review on generalised vaccinia Jubb[1] stresses the infrequency of the condition, and emphasises that the association of purpura with vaccination is very rare. He does not refer to any recorded association between allergy and the development of postvaccinial manifestations. During the recent small outbreak of smallpox in the Edinburgh area, when a large proportion of the population was vaccinated or revaccinated, we observed, in the course of routine practice, four patients manifesting generalised complications after vaccination in whom there was presumptive evidence of an underlying allergic diathesis.

CASE-RECORDS

Case 1.—A married woman, aged 28, admitted to hospital with a generalised skin eruption. She had been vaccinated in infancy and was revaccinated 10 days before admission. This second vaccination had been performed in the usual manner with official calf-lymph on the left upper arm. An ulcerating sore with well-marked surrounding erythema developed by the fifth day and at the same time an eruption appeared over both arms, front of chest and abdomen. On admission the patient had a mild pyrexia of 100° F. with a pulse-rate of 100 per min. and complained of a slight aching low back pain, but her general condition was good. She was bright, cheerful and did not complain of headache. A papulo-vesiculai [illegible] front of [illegible] eruption [illegible] was no [illegible] The papules were hard or "shotty," many of them displayed vesiculation and umbilication, and all were at about the same stage of development. The photographs (see figure) were taken on the second day in hospital. During the next 4 days the eruption passed rapidly through vesicular and pustular stages and then to scab formation. At no time was the patient's temperature higher than 100° F., nor did her general condition deteriorate. On her discharge 19 days after admission only slight scars were evident and her general health appeared excellent.

This patient had had about three attacks of asthma a year since early childhood. Her skin had always been sensitive: she had often suffered from macular rashes and urticaria.

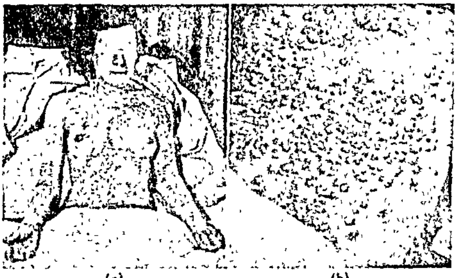
Case 2.—A boy, aged 4 years, who had been vaccinated in infancy. The present illness began 8 days after a successful secondary vaccination which resulted in a moderately severe local reaction. He had severe pain, beginning in the right ankle and passing to the knees, hips, back and then the wrists, accompanied by œdema of the affected joints and the face. Shortly after the onset of the joint pains, severe spasmodic pains developed in the abdomen, mainly in the left hypochondrium, which was tender on palpation. Diaphragmatic spasms were also noted. During the first 2 days of the illness a papular rash appeared on the trunk and back. Some of the papules were raised and hæmorrhagic. No rise of temperature was noted on repeated examination; this contra-indicated a diagnosis of rheumatic fever which was suggested by the symptoms. The urine was normal. The blood showed a slight leucocytosis of 10,800 white cells per [illegible] days, and the patient made an uninterrupted recovery.

This patient had no personal history of allergic manifestations, but his mother and brother (aged 6 years) were both sufferers from hay-fever and asthma. The mother was an asthenic, nervous woman. The clinical features were thought to be the result of urticarial lesions in the bowel, diaphragm and joints.

Case 3.—A woman, aged 40, who was of a neurotic type and displayed a moderate degree of hirsutism and acne suggestive of endocrine imbalance. She had previously had right-sided pneumonia and empyema resulting in a permanent bronchopleural fistula with a chronic purulent discharge. Gross pulmonary fibrosis was present and the mediastinum was displaced to the right. She had recently greatly improved in health and could visit her friends and attend concerts and cinemas. Primary vaccination had been carried out in infancy, and revaccination resulted in a satisfactory "take" with no local complications. Eight days later she became very ill with pyrexia, severe dyspnœa, and œdema of face and legs. A papular rash appeared, mainly on her back. Some of the papules were hæmorrhagic; many became pustular. Septic lesions also appeared between the fingers and toes. Blood examinations revealed no anæmia, but there was a polymorph leucocytosis of 23,000 white cells per c.mm. The temperature fell to normal after 3 days, but 2 days later the patient died of cardiac failure.

Although in this case there was no history of allergic manifestations, the chronic sepsis may have resulted in an acquired sensitisation.

Case 4.—A girl, aged 12 years. For 6 years she had suffered from purpuric manifestations which took the form of epistaxis, spontaneous petechiæ, severe bruising after slight injury and severe bleeding after tooth extractions. There had been no swelling of joints, vaginal bleeding, hæmaturia or melæna. She was investigated in hospital in 1939 and 1940 but no cause was elicited for the purpura; the spleen was not enlarged, platelets were present in normal numbers, capillary resistance, bleeding and clotting times were normal. The only other previous illnesses recorded were measles when a baby and scarlet fever at the age of 4 years. The patient's parents and four siblings were alive and well. No history of allergic or hæmorrhagic manifestations was obtained, except that the mother was said to bruise easily. The patient's environment was reasonably good and there was no evidence of dietary deficiency. Since her discharge from hospital in 1940 she had kept fairly well and had only had two attacks of epistaxis, although purpuric spots appeared frequently.



(a) (b)

Vaccinial eruption in case 1, eleven days after vaccination. (a) General view showing distribution; (b) close-up of antecubital fossa showing character of eruption.

Eight days before the present illness a primary vaccination was performed. She was readmitted to hospital on the ninth day for severe epistaxis. On admission the epistaxis had ceased but the patient was very exsanguinated and numerous petechial hæmorrhages were present. At the site of the vaccination there was a large purple swelling with a large black necrotic centre. On the third day after admission the epistaxis started again and was controlled with considerable difficulty by packing. A blood-transfusion was given. At this time a middle-ear infection developed. Investigations aimed at determining the underlying cause of the bleeding like those previously performed resulted in no abnormal findings. She was discharged 3 weeks after admission in good general condition with no evidence of purpura.

In the absence of any evidence pointing to abnormalities of the clotting mechanism, it must be assumed that this patient's hæmorrhagic defect lay in the capillaries, and accordingly this case may be regarded as an example of vascular purpura. The failure to obtain a history of any toxic or infective condition that might damage the capillaries suggests the possibility of an allergic basis. The onset of the epistaxis 8 days after vaccination and the severity of the bleeding compared with that of previous episodes warrant the assumption that the attack was precipitated by the vaccination. This case is accordingly presented as a further example of an untoward vaccinial reaction in a subject suffering from purpura, possibly of an allergic type. The desirability of vaccination in the presence of such a hæmorrhagic tendency is obviously open to question.

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[1] Jubb, A. A. *Brit. med. J.* 1943, i, 91.

SUMMARY

Four patients, of ages ranging from 4 to 40 years, developed abnormal reactions 8–10 days after vaccination. Purpuric manifestations appeared in 3 of the patients, 2 of whom developed well-marked œdema at the same time. The remaining patient showed generalised vaccinia.

These abnormal reactions may be related to an allergic tendency, since in case 1 there was a personal and in case 2 a familial history of allergy, and in the other 2 cases there were clinical grounds for postulating the presence of abnormal sensitivity.

We wish to thank Prof. D. M. Dunlop for allowing us to quote the history of case 4, who was under his care.

Reviews of Books

Encephalitis

A Clinical Study. JOSEPHINE B. NEAL, MD, SCD, FACP, associate director, bureau of laboratories, department of health, New York; clinical professor of neurology in Columbia University; and collaborators. (Lewis. Pp. 563. 42*s.*)

THIS is a useful work, midway between a textbook and a monograph; it does not break new ground but provides a reliable conspectus of the subject. Some aspects (e.g. treatment) are dealt with more fully and contain more original observations than the rest. Dr. Neal has been responsible for the chapters on types of encephalitis, symptoms, clinical course and treatment. They are well-informed, comprehensive without being exhaustive, and based on some 700 case-histories, many of them referring to patients who had been under observation for more than five years. An interesting chapter by Neal and Harrington reports the neurological complications after acute infections and vaccination, observed in about 200 patients. Tracy Putnam writes a short, clear account of the surgical treatment of post-encephalitic symptoms. Rosner reviews the psychiatric sequelæ in adults, and Lauretta Bender those in children. The lengthy review of the pathology of the various forms of encephalitis (occupying a quarter of the book) is by Lewis Stevenson. Recent work by Weston Hurst and others had unfortunately not been published when the book was being prepared.

Year Book of General Therapeutics 1942

Editor: OSCAR W. BETHEA, PH M, MD, FACP. (Year Book Publishers; Lewis. Pp. 512. 19*s.*)

THOUGH the flow of medical writings from Europe has virtually ceased and that from this country is greatly curtailed this Year Book is as packed with information as ever. Various articles show that final agreement on the best way to treat burns has not yet been reached; for topical application, sulphadiazine is recommended by the National Research Council as the sulphonamide of choice. An interesting investigation by Willis M. Fowler and Adelaide P. Barer showed that after the withdrawal of 555 c.cm. blood it takes nearly 50 days for the donor's hæmoglobin to return to normal, though by iron therapy this interval can be reduced to 35 days. The writers recommend that at least three months should elapse between successive donations. A small series of cases of barbiturate poisoning unresponsive to nikethamide reacted well to repeated intravenous injections of picrotoxin; but it is not stated whether nikethamide was tried in really heroic dosage. The why and wherefore of the so-called interrupted treatment of hypogonadism by stilbœstrol are discussed in a summary based on some of the work of Cyril M. MacBryde and others. An article on the rational therapeutic approaches to migraine by Lowell S. Trowbridge, Theodore J. C. von Storch, and Merrill Moore is of particular interest to the general practitioner so often called upon to cope with this condition when the consultant has failed.

Renal Lithiasis

CHARLES C. HIGGINS, MD, Cleveland Clinic, Ohio. (Charles C. Thomas. Pp. 140. $3.)

THIS little book, based on Dr. Higgins's Beaumont lectures, embodies much of his work on this subject. The earlier chapters are devoted to a description of the animal experiments which led to the development of the high vitamin-A acid- or alkaline-ash diet which has reduced so strikingly the incidence of recurrent stone formation. Since 1932 the incidence of stone recurrence in the Cleveland Clinic after operative interference has fallen from 16·4 to 4·9%. In more than 40 cases renal calculi have dissolved after appropriate dietetic measures. Dr. Higgins stresses the importance of careful pH estimations, which in many cases must be made on the urine secreted by each kidney. Oxalate calculi have not yet been persuaded to disintegrate, and the presence of urea-splitting organisms usually interferes with the treatment by preventing the achievement of the necessary low pH.

The value of the acid- or alkaline-ash diet is perhaps not sufficiently widely recognised, especially in view of the increase of urinary calculous disease common in time of war. The matter is perhaps a little unbalanced, and the indications and technique of operative interference are rather sketchily described; but the dietetic regimens set out here will be particularly valuable to the clinician, though some of the menus suggested would be difficult to come by today.

The Rat in Laboratory Investigation

Editors: J. Q. GRIFFITH, Jr., MD, associate in medicine, University of Pennsylvania; E. J. FARRIS, PH D, executive director and associate in anatomy, Wistar Institute of Anatomy and Biology. (Lippincott. Pp. 488. 45*s.*)

THE preface to this American book points out the unique position of the albino rat as a laboratory animal, and the book itself endeavours to do justice to the contribution which this rodent has made to scientific knowledge. It is the fullest book so far produced on the subject; Donaldson's book on the rat, hitherto the only handbook, is now long out of date. Whether the present volume is really complete or not can only be discovered by those who will use it. An omission in the chapter on breeding and rearing is that of a growth curve, for though most laboratories construct one for themselves curves derived from very large numbers of male and female animals, and thus furnishing some standard for normal and optimum growth, would have been useful. There is a great deal of material dealing with the rat in nutritional experiments, but anatomy, surgery, pathology, histology and psychology are also well covered. The use of the rat in the biological testing of hormones is set out, and the principles of biological standardisation are briefly enunciated, but the biological testing of vitamins is not described, probably because the subject has been dealt with by others. The known dietary requirements of the rat are discussed item by item, and there is a lengthy table of dosages of drugs. The book is expensive but all laboratories in the habit of using the rat for any experimental purpose should possess it. Thirty authors contribute to it; there are many illustrations and a full bibliography to every chapter.

Forensic Medicine

(8th ed.) SYDNEY SMITH, MD EDIN., FRCPE, DPH. (Churchill. Pp. 660. 28*s.*)

CONSIDERING the time allotted to the subject in the medical curriculum forensic medicine is surfeited with sound textbooks. Littlejohn, Sydney Smith, Glaister (father and son), and Douglas Kerr from this country alone provide atlas form, academic authority, technical assay, and the students' vade-mecum respectively. And Peterson & Haines or Gonzales, Vance & H[illegible] are at his elbow from America. This volume [illegible] the sound if now somewhat old-fashioned looking textbook it has ever been. It is beyond reproach in text authoritative, adequately revised and correctly didactic We have before remarked on inadequacies in the [illegible] tions.

THE LANCET

LONDON: SATURDAY, JULY 24, 1943

SERVICE PENSIONS

THE amended Pensions Warrant, issued as a white-paper[1] on July 14, opens the door to a more generous award of pensions and sweeps away many of the present anomalies of administration. As a matter of official convenience the warrant refers only to the Army, but comparable changes apply also to the Navy and the Air Force, and they will also govern awards in the Civil Defence forces and the Mercantile Marine, as well as compensation for war injuries incurred by the civilian population. In future, when a pension is claimed for wound, injury or disease attributable to war service or aggravated by such service, it will not be necessary to prove that they are "directly" attributable or "materially" aggravated as at present; nor will the onus rest on the claimant to prove the fulfilment of these conditions. If there is a doubt in the matter, the benefit of the doubt is to be given to the claimant. Further, where there is no official record of death, injury or disease other corroborative evidence may be accepted. The effect of these changes will be felt at every medical board at which the question of attributability or aggravation has to be decided and will at once increase the number of cases in which the board will decide in the claimant's favour. The new provision which accepts accidents as attributable to war service, with the sole exception of those "sustained whilst actually on leave"—that is, the seven-day leave or longer—will remove a long-standing grievance. Other changes will enable the re-employed pensioner to draw the full pension of his previous employment, will provide more adequate allowances for widows and children, and will determine the need of dependent parents more generously. Even when the illness or injury is ruled as not attributable to service any claimant found to require treatment after discharge will be able to draw treatment allowance up to a maximum period of six months. Officers retiring on disability pay will no longer have to pass a needs test for the award of family allowances. The hardship felt by those whose marriage after injury does not entitle them to the married allowance is not fully met, but one important exception is made: men whose pensionable disablement is so serious as to preclude employment will be able if they marry after the injury to draw allowances for wife and children, and if the wife becomes a widow she will be granted her pension and children's allowances. Finally, the amended warrant goes so far as to provide machinery, outside the pensions administration proper, for widows unfortunate enough to have no title to pension of any kind. Should a man, not previously insured, die after less than two years' service from causes not connected with it, his widow has no statutory claim. There are, it seems, only some 300 of these cases, and they are now to draw a discretionary allowance of 10s. a week from a special fund administered by the Royal Patriotic Fund Corporation.

Some classes of cases are still excluded from pension rights, specifically those in which "the consensus of medical opinion," as the white-paper has it, regards the disease as constitutional, and therefore not attributable to service. This list includes cancer, diabetes, coronary thrombosis and some neuroses. But with the gate to eligibility for pensions opened so wide there is a case for considering whether it is really necessary to exclude any injury, disease or death occurring to a man or woman while on service. The Minister of Pensions will no doubt pay due attention to medical opinion, but it is understood that some cases of cancer and of coronary thrombosis, for instance, "aggravated" by service, have already been accepted as liabilities. More of these constitutional cases will certainly be admitted by appeal tribunals who will have to consider every case on its particular merits. The concession made to the 300 widows not eligible at present for any pension is another pointer towards the acceptance of a wider responsibility. Would it now be simpler to arrange that all entrants to service are held insured, and payments made from the pensions fund after an initial period of (say) three months, or even on enlistment? The simplest procedure would be to accept an all-in liability for every kind of injury or disease, every death from whatever cause, and to cover the outlay by insurance provisions as is now done in respect of unemployment. Medical board procedure would be simplified, appeal tribunal procedure limited to the question of assessment, and service administration vastly reduced. It takes a big staff to run the administrative side of the Ministry of Pensions; the number of medical and associated (e.g., nursing) personnel, as stated by the Secretary to the Treasury in answer to a recent question in the Commons, is now 1276, and the cost of this medical service is over £300,000. Simplification in procedure would certainly lead to economy of man-power and especially of medical man-power, and to a saving of money on medical and appellate administration which would be a gain, and might be a very substantial gain, to the Exchequer.

The Government Actuary could be relied on to make a good working estimate of the balance of loss and profit to the tax-payer on the change-over from attributability to all-in liability. He would not be asked to assess the value of its effect on the lives of men and women in the Services. The House of Commons has shown its deep interest in such values. During the second reading debate on June 24, which nominally turned on the mechanism of appeal against the decisions of pensions boards, wider and more human issues were raised from every side of the house. "The House wants generous treatment of these people," was a statement that went undisputed, "the country wants it, and I believe we can find a better solution of the problem." That solution might be found in acceptance by the state, for all Service personnel, of such a simple all-in insurance liability—what has been aptly called a Beveridge principle applying to the Services. Nor would that be more than a beginning, for in proportion as the Tomlinson report becomes effective—and it has been called a charter for the handicapped—will the emphasis shift from monetary compensation to restoration of earning capacity.

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[1] Changes in War Pensions. Cmd 6459 HMSO, pp. 12, 2*d*

PENICILLIN IN AMERICA

NEWSPAPER reports from the United States say that an easier and cheaper way of making penicillin has just been discovered. Meanwhile, there as in *this country, penicillin is still so scarce as to be* available only to the chosen few; although some 16 companies are engaged in its preparation, supplies are very short and are being concentrated largely for Service needs.[1] Among more than 300 Service patients that have been, or are being, treated, penicillin has lived up to its earlier reputation as a specific cure for all manner of staphylococcal infections, acute and chronic osteomyelitis, carbuncles, pneumonia and empyema, infected wounds and septicæmia. It also seems to have been used successfully in the treatment of streptococcal, pneumococcal and gonococcal infections which proved resistant to sulphonamide therapy.

In a more detailed report from the Mayo Clinic, HERRELL[2] confirms the miraculous curative effect of penicillin in severe and generalised staphylococcal infection. He makes use of a continuous intravenous drip of normal saline or 5% glucose containing 10,000 to 20,000 Oxford units of penicillin per litre given over 10–12 hours. Apart from two chronic staphylococcal sinuses treated locally and one subacute case with multiple abscesses treated successfully by local injection into the abscesses, there were five cases of severe staphylococcal infection (3 facial cellulitis, 1 pyelonephritis and 1 postoperative wound infection), one case of cellulitis of mouth and tongue due to a non-hæmolytic streptococcus, and one case of subacute bacterial endocarditis, all treated by intravenous drip and a total dosage varying from 64,000 to 200,000 Oxford units. The clinical description of these cases leaves little doubt that the prognosis was poor; indeed, in the three cases of staphylococcal cellulitis of the face, two with a pronounced leucopenia, death might well have been expected. Yet all these patients, except the one with subacute bacterial endocarditis, made rapid and uninterrupted recoveries. There were no toxic effects. The failure to cure bacterial endocarditis despite temporary sterilisation of the blood-stream is in line with the FLOREYS'[3] experience.

The scanty supply of penicillin makes it important to define the kind of infection for which this substance is specially indicated. First priority should be given *to its use in the treatment and prevention of chronic* osteomyelitis and other persistent staphylococcal infections which caused so much invalidity among the wounded of the last war. Its value in the treatment of gas gangrene should also be tested, for MCINTOSH and SELBIE[4] found it superior to the sulphonamides [illegible] in experimental infection with [illegible] and *Cl. œdematiens.* Pyogenic (non-meningococcal) meningitis, empyema and the pyæmic infection associated with anaerobic streptococci which follows septic abortion or gangrene of the appendix are other conditions in which penicillin should prove useful. The spread from case to case of streptococci and staphylococci which have acquired sulphonamide resistance in locally treated wounds an burns may become rather a worry, as it is in gonococcal infections; and here again penicillin may prove its worth. It should be possible for laboratories to prepare crude extracts potent enough to be effective in the treatment of these local infections. Meanwhile, until supplies of the purified substance are sufficient to allow a wider distribution, the centres at w it is being used might be made better known, so that suitable cases from other hospitals could be transferred for treatment.

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1. American Committee on Medical Research: *J. Amer. med. Ass.* 1943, 122, 235.
2. Herrell, W. E. *Proc. Mayo Clin.* 1943, 18, 65.
3. Florey, M. E. and Florey, H. W. *Lancet*, 1943, i, 387.
4. McIntosh, J. and Selbie, F. R. *Ibid*, p. 793.

POWER AND PEOPLE

> "Men, women and children were yoked together with iron and steam. The animal machine—subject to a thousand sources of suffering—was chained fast to the iron machine which knows no suffering and no weariness."

OUR forefathers were up against economic fatalism The masters of industry had persuaded the publ *that perfect freedom from state control was the* best stimulus to production and that uncontrolled competi tion would be to the ultimate interest of the workers as well as the employers. It was believed that th selfish employer would protect his labourers in th interests of better output and that he was by tha token a public benefactor. The fallacy of this theor exposed itself before the end of the last century when the state had to step in to salvage the wreckag produced by industrial neglect. But the industrial war is not over; it has still to be patiently waged in new fields.

Medical men in Scotland have seen something of the long-drawn controversy over the Highland hydro-electric scheme. It is not their function t *pronounce on its industrial merits, but they have* a duty to examine its provision for health and safety and the welfare both of the inhabitants of the area concerned and of the workers on the job. The prin cipal object of the scheme is to attract to the High lands industries which require cheap and abundan electric power, and it is good to find some indication of collective responsibility for welfare:

> The Board shall, so far as their powers and duties collaborate in the carrying out of any measures for the and social improvement of the North of Scotland district any part thereof.

Brave words, but surely a little vague. With wh is the board to collaborate, and what are the limi of their powers and duties? Are they to exercise control over the industrial development that expected to take place, or are their powers and duti confined to their own works? Clause (5) deals w constructional schemes and inserts the comme provision *that they shall have regard to*

> the provision for the officers and servants of the Board and persons engaged in or in connection with the constructi maintenance or management of any works authorised by Act of housing accommodation and any other b serving a beneficial purpose in relation to the requireme of such officers and servants or persons.

Good so far as it goes; but it would greatly public confidence, so much shaken by the past, if provisions were more specific and made reference measures of health and safety. We do not want come back afterwards and hear them say like Shylo "*I cannot find it; 'tis not in the bond.*" The clause of importance to medical men as disinteres observers is one which says that the board shall regard to the desirability of preserving the beauty of the scenery, and of avoiding as far as possible injury to fisheries and to the stock of fish in any waters The Secretary of State is to appoint an amenity committee and a fisheries committee, and the board must consult them when they are preparing a constructional scheme The Secretary of State may refuse to confirm a scheme, if the advice of these committees is rejected by the board This clause also is progressive, and no one would deny the importance of beauty and fish

But where as doctors we should expect to find leadership is in making provision for the care of men And there is a parallel case, to serve as a precedent, in the Act of Congress establishing the Tennessee Valley Authority[1] The main purposes of the American and Scottish schemes are similar—namely, the provision of cheap and abundant electricity—but the difference in outlook is striking The Act of Congress says that "the projects herein provided for shall be considered primarily as for the benefit of the people of the section as a whole and particularly the domestic and rural consumers to whom power can economically be made available, and accordingly that sale to and use by industry shall be a secondary purpose " Section 22 of the Act is wide and generous in its terms

> To aid further the proper use, conservation, and development of the national resources of the areas the President is hereby authorised to make surveys of and general plans for these areas all for the purpose of fostering an orderly and proper physical, economic and social development of the areas and is further authorised to make such studies, experiments, or demonstrations as may be necessary and suitable to that end

How significantly this direction for research, which is in fact being carried out on an immense scale in public health and agriculture, compares with the mean little Scottish clause

> The Board may conduct experiments or trials for the improvement of methods of generation, distribution or use of electricity in the special conditions and circumstances in the North of Scotland district

And, lastly, the Act of Congress makes extensive provision for general progress "The President shall, as the work progresses, recommend to Congress such legislation as he deems proper for the especial purpose of bringing about the economic and social well-being of the people living in the said areas " The TVA have, in fact, accepted the theory that they have a moral duty to the people and their culture, to the soil and its fertility, to the environment and its amenities, and indeed to the whole welfare of the lands and their people They have applied this theory during the period of construction, providing for the comfort, safety, health and welfare of their temporary labourers, and caring at the same time for the native folk both during the invasion and after wards Their aim is to make the community better off than they found it, but they also accept responsibility for making the community better and happier than they found it

In the first stage food and lodging has to be found for the temporary workers—the transplants Many health and social problems arise in the remoter areas, which correspond very closely with our High lands Several methods of procedure are open to them The authority may do nothing, leaving the men to the tender mercies of the private contractors In this country we know from experience what that means Or they may construe their functions narrowly and provide the minimum dormitory and feeding accommodation in shacks, caring nothing for the families of married men Doctors know the devastating results of such a policy, especially upon the children The TVA take a wider view, they argue that five years is a big slice of life, so they provide first a restaurant of good quality, warm, bright and well decorated, and a canteen close to the working face, a library, a reading room and a smoke room, dormitories with bunks for the single workers and prefabricated houses for the men with families, all with central heating and good indoor sanitation The most important and universal provision, however, is the "health and safety" organisation—and it is significant to observe that the two are combined. Under a full-time medical officer each works area maintains a forward dressing station and an ambulance near the working face, with a day and night service Thence the more serious cases are sent at once to the main "health centre' about half a mile away This health centre has important routine functions every workman is examined on entry and a Wassermann test is made as a matter of course, if this is positive, he must either accept treatment or leave Immunisation against the enteric group and smallpox is practically universal, and men with doubtful chest signs are X-rayed on the spot On the other hand there is no attempt to exclude disabled persons, the object is to assess what work each one can do without injury to his health or the safety of the community The first aim of the centre is prevention, and the men are obliged to report any injury at once no matter how trivial it may appear On this side the safety department is a great asset, its officers continually comb out every part of the work as it progresses, watching and recording its hazards By educational methods they attack slovenliness and carelessness from all sides, and try to eliminate or modify operations which cause undue exposure to accident A man who disobeys safety instructions is peremptorily dismissed Each county health authority has, as in this country, a statutory duty to provide for the health and welfare of its inhabitants, and the policy of the TVA is not to replace the local authority but to supplement its work This amounts in effect to a substantial grant in money and services, but there is no interference with local autonomy

The magnificent example of democratic planning carried out by the TVA teaches many lessons Two of these are of especial importance to the medical profession That any long term constructional scheme should provide for the community life of the temporary workers, including homes for men with families, and a well-designed health and safety organisation, with hospital facilities when the works are in remote areas And that the permanent scheme should foster (in the words of the Tennessee Act) an orderly and proper physical, economic and social development of the areas We have seen too many industrial developments make a wilderness and call it prosperity

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o of LL D of the University of
shal Sir Harold Whittingham,
Services

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[1] TVA an Achievement of Democratic Planning By Julian Huxley, D Sc FRS *Architectural Review* June, 1943

Annotations

NO VACCINE FOR MALARIA

THE success of active immunisation against an increasing number of bacterial and virus infections raises the question why it is not yet possible to give protection against malaria by injections of vaccine. This is not because of any lack of interest among research workers *or even because of the still unsurmounted difficulties* of growing satisfactory cultures of the parasite. Coggeshall[1] has recently reviewed the whole subject of immunity in malaria, and from his own researches as well as those of many others it is clear that the nature of the immune response to malarial infection is what precludes any reasonable hope of conferring a worth while artificial immunity. It is not that antibodies fail to develop—agglutinins, complement-fixing antibodies and protective antibodies have all been demonstrated in infections of birds, monkeys and men. It is rather that immunity is of short duration and is limited to protection against the infecting strain, and this limitation applies even after actual attacks of malaria during which much greater amounts of protective antibody appear in the serum than have been found after the most persistent attempts at immunisation with artificially attenuated parasites. Experimental findings in monkeys and humans infected with *Plasmodium knowlesi* accord well with the known facts regarding the malarial immunity naturally acquired by the native inhabitants of areas where malaria is hyperendemic. In the first four years of life, before immunity is well established, attacks are frequent, and infant mortality from malaria is high. But repeated infections and relapses lead to an increasing production of protective antibodies, so that attacks of fever become shorter, milder and less frequent until at last equilibrium is reached between host and parasite—an "infection immunity" depending on the continued survival of at least a few parasites within the body. If an acute infection is cut short in its early stages antibodies fail to develop; if a chronic infection is completely eradicated antibodies disappear in a few months; hence, as Hughes[2] emphasises, the aim in treating natives of a hyperendemic area is not so much to cure infection as to tide the patient over his attack with a minimum of drug therapy so that he gradually ceases to suffer clinical effects from the surviving parasites necessary to maintain his immunity. A native who has acquired immunity to the strains of his own area is still susceptible to infection by strains, even of the same species of malaria, from another neighbourhood, and he is, of course, quite unprotected against any species not found in his own district. Bearing in mind the multiplicity of individual strains among the three main species of malaria parasite and the short duration of the natural immunity acquired from a single attack it will be seen why effective protection by malarial vaccines cannot be achieved unless new strains are discovered which have much wider and more powerful antigenic properties. Because of the slow development of protection, the immunological considerations which govern treatment of native peoples scarcely influence malaria therapy in Europeans, especially soldiers, whose residence in any one tropical district is often short and whose efficiency must not be risked for the sake of an immunity which they might acquire some years hence at the cost of many relapses. Under the stimulus of war, therefore, investigations naturally proceed along the lines of more effective suppression and treatment of infections by means of drugs; much has still to be learned of the best means of using quinine, mepacrine and pamaquin. At the same time new hopes have been raised by the discovery that it is possible to eradicate completely an acute or chronic *P. knowlesi* infection in the monkey with a single dose of sulphanilamide by mouth. Similar results have not been obtained in natural infections of man, but the sulphonamides are by no means inactive against human strains and the search for one which will be a safe and effective causal prophylactic has received a new stimulus.

MORE BIRTHS

IN the first three months of this year the birth-rate in England and Wales was higher than in any other first quarter since 1928. The recent figures are:—

Year	Total live births in 1st quarter	Rates per 10 population
Average for 1934–38	148,877	14·8
1939	153,382	15 0
1940	154,345	15 0
1941	147,027	14·4
1942	158,225	15·5
1943	171,819	16·8

Much of the increase is certainly due to the large numbe of marriages in the early stages of the war. Wherea between 1934 and 1938 the annual total fluctuated between 342,000 and 362,000, the figure rose to nearl 440,000 in 1939 and over 470,000 in 1940. Since the the number has been reverting more to the normal, wit 387,000 in 1941, 368,000 in 1942, and only 62,337 in th first quarter of 1943. A continuation of the present hig level birth-rate is therefore not to be expected, and would be wrong to conclude that this small rise fertility confounds the prognostications of a fall population in the relatively near future. Clearly temporary increase due to such causes can have [illegible] than a passing effect, and the aim of any policy encourage parenthood, as urged on the Government the debate reported on p. 113, cannot be merely to hast marriage and the birth of a first child, but must enc generally larger families than are now the fashi Of the births registered in the first quarter of 19 88,815 were males and 83,004 females, a ratio of 10 males to 1000 females; this proportion, as periods war have revealed before, is higher than usual, the av age for the ten preceding first quarters being 1058. these totals 5·9% were illegitimate compared with 5· in the first quarter of 1942.

Following the record figures of 1942 the incidenc mortality continues to fall very lightly. Deaths, inc ing non-civilians, numbered 137,568, giving a ra 13·5 per 1000, the lowest first-quarter rate since 19 and, if the age of the population is taken into acco the lowest on record in England and Wales. The in mortality experience was likewise good; the 60 dea per 1000 live births is 14 below the average of the preceding first quarters. The 5782 stillbirths repre 3·3% of the total births registered.

In an appendix to his return, the Registrar-G gives the number of deaths by different causes registe in each quarter of the year in 1940, 41 and 42, the fig for the final quarter of 1942 being previously unp They show that deaths from respiratory and other fo of tuberculosis have continued to fall below the war-increased levels of 1941, while deaths from cere spinal fever in the last quarter of 1942 numbered than half those in the corresponding quarter of 1 Mortality from diabetes has again been relatively lo

CURATOR AND HISTORIAN

Dr. C. J. S. Thompson died last week at shortly before his 81st birthday. It was in 1900 Henry Wellcome conceived the idea of a te museum of medical history and asked Thomps embody it, and for 26 years he travelled in sear objects of historical interest, collecting much cu knowledge but also medical friends wherever he w that few are aware that he was not himself tra the medical profession. His doctorate was in philosophy and he was brought up in the pursuit of chemistry and pharmacy at Liverpool where in 1896 he produced *The Chemist's Compendium* which was crammed with information of value to the practitioner and as it grew through many editions became the "Whitaker" of pharmacy. This ready pen can hardly have stopped writing, for year by year appeared brief scholarly articles on the objects of his search and, as his experience widened, a galaxy of illustrated volumes in popular vein on subjects such as quacks, monsters, apparitions, astrology, alchemy, poisons, crime, magic and love. In foreign libraries he transcribed medical manuscripts (Prague had a special attraction for him), he had the luck and skill to trace a Caxton mislaid in the Lambeth library, and when Glasgow Royal Infirmary was rebuilt he secured for his museum the equipment which Lister used for the first demonstration of antiseptic surgery. At big assemblies his knowledge of things and his way with persons made him a first-rate organiser and the historical exhibit at the International Congress of Medicine held in London just before the last war was outstanding in one of medicine's most brilliant occasions When that war came he raised and trained two voluntary aid detachments and commanded [illegible] military [illegible] k at the [illegible] ollowing [illegible] curator of the historical collections in the Hunterian museum He had already been spending mornings with D'Arcy Power compiling a *Chronologia Medica* and with unfailing energy he set himself to complete Doran's catalogue of surgical instruments, forming a collection of his own of casts and photographs of the hands of surgeons. Most of this was destroyed in the blitz of May 1941 but many of the instruments were salvaged and Thompson was able to revise his brief sketches of 1937 n the *British Journal of Surgery* for a slim volume which appeared last year with lavish illustration in New York This was his last published work but another book is ready for the printer, when paper is available, and his literary executor will not lack occupation, for Thompson's illeggiatura at Cuddington, near Aylesbury, was no etirement but a struggle with himself which material f his collection to engage his mind His heart he had ft at Lincoln's Inn Fields and though his body rests nder a thorn tree in the graveyard at H[illegible]twell, where a Bourbon king lived in exile, his memorial is international ecognition as curator and historian Curator of his orians would perhaps express it more truly

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[1] Coggeshall, L. T *Medicine, Baltimore*, 1943, 22 87.
[2] Hughes W. *Trans. R. Soc. trop. Med. Hyg.* 1942, 36, 60.

WHITHER PHARMACY?

For some years pharmacists have been expressing issatisfaction with their profession, and shortly before he war the Pharmaceutical Society set up a committee inquire into the prevailing practice In its report ompleted about eighteen months ago this committee rged the need for greater economic cooperation among e independent small men, and also advocated participa on in a state medical service Since then an independent ody of pharmacists, self elected but nevertheless lequately representative of all branches—wholesale, tail, hospital and teaching—have issued a compre nsive review called the *Brighton 1942 Committee s port*. According to this report, most existing estab lhments where medicines are prepared have insufficient aff and equipment to give the public the varied services hich modern medicine demands The mass production medicinal remedies and the associated propaganda ve led, they say, to the prescribing of proprietary edicines which often have no relation to the patient's ecial requirements, there has been a [illegible] many pharmacists to extend their trading activities, and the lack of recognition of pharmacy as a part of medical science has compelled pharmacy to function as a separate entity. But the committee believe that some features of the present service are worth preserving and should be imported into any projected reorganisation. When Assumption B of the Beveridge report becomes operative some changes in present pharmaceutical procedure will be unavoidable. The present arrangements for the dispensing of insurance prescriptions are based on the existence of the private medical practitioner, and the Pharmaceutical Society is anxious that pharmacists should continue to carry out all dispensing, as their education and training has been designed primarily for that purpose At a recent meeting of representatives from all parts of Great Britain, the president outlined the society's view of the pharmacist's place in a comprehensive medical service He maintained that existing pharmacies could provide as efficient a service as that which could be instituted in health centres, but he did not deny that existing facilities must be improved to keep abreast of developments in therapeutics More than a simple extension of National Health Insurance is required. Each pharmacy must be regarded as an individual unit in the state service and placed under central control; this control would be exercised through a Pharmacy Commission, acting under the Minister of Health, which would decide on conditions and hours of service, and standards for individual pharmacies, and control might include in its supervisory sphere the dispensaries opened by hospital or local authorities The plans envisage a twenty-four hour service in urban areas Such alterations would necessitate adequate payment for the service provided Present payments for insurance dispensing have been made on the assumption that an already profitable business is being carried on and that the overhead charges can be subsidised by the more lucrative non-medical items sold over the chemist's counter. This would be an untenable position for a partially state operated system, the pharmacist would expect to be recompensed for his overhead expenses, cost of drugs and work involved, possibly on the basis [illegible] No doubt [illegible] control of

THE WELLCOME FOUNDATION

Impending changes in the senior scientific staff of the Wellcome Foundation include the retirement of Dr C M Wenyon, FRS, director in chief of the Wellcome Research Institution and director of the Wellcome Bureau of Scientific Research After more than 36 years of fruitful association with the research laboratories founded by Sir Henry Wellcome, Dr Wenyon has agreed to retain the former appointment until next year when Dr C H. Kellaway, FRS, at present head of the Walter and Eliza Hall Institute in Melbourne, will be able to succeed him Colonel N Hamilton Fairley, FRS, now director of medicine with the Australian Army in the Pacific, is to be the new director of the Bureau of Scientific Research, which will be amalgamated with the Wellcome Chemical Research Laboratories (London) when Mr T. A Henry, D SC, their present chief, retires at the end of next month Further development of the chemical research laboratories at Beckenham is planned for the period immediately after the war In the United States Dr. Erwin E Nelson, of Tulane University, has been appointed to charge of the Wellcome Research Laboratories at Tuckahoe, N Y.

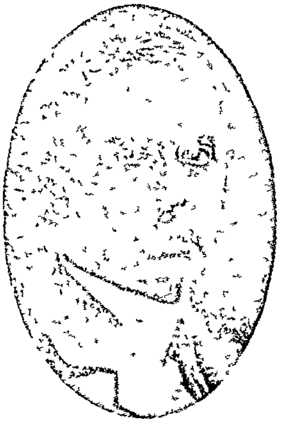
Dr. A. T. Amor has been appointed chief medical officer of the Ministry of Supply in succession to Air Vice-Marshal Sir David Munro, who has been appointed medical adviser to the ministry.

Special Articles

KARL LANDSTEINER

1868–1943

Landsteiner was one of the diminishing band of workers who can proudly recall their active association with some of the great pioneers of bacteriology and immunology—with Behring, Ehrlich, or Gruber. For nearly half a century he witnessed the steady development of these sciences, adding much himself to the vast store of new knowledge.



Born in Vienna in 1868, he graduated in medicine at 23, and some years later became an assistant in the Vienna institute of hygiene, then directed by Max von Gruber. Here, in 1897, he began his immunological investigations, but he later moved to the pathological-anatomical institute of the university as an assistant to Weichselbaum.

The occurrence of iso-antibodies in human blood was observed as early as 1892, but the trend of research was to establish a connexion between iso-agglutination and disease, with the result that most immunological studies on this subject published before 1900 were attempts to associate iso-agglutinin formation with a diseased state: It is to Landsteiner's credit that order was brought out of chaos. In 1901 he described three types of blood which he believed were not developed through a pathological change but were manifestations of a constitutional difference. Shortly afterwards a fourth type of blood was described by Decastello and Stürli. These findings were soon confirmed and extended by other workers until the exact relation of the different blood-group factors to their corresponding iso-antibodies became clear, and a practical result of immense importance emerged—the successful transfusion of whole blood.

In collaboration with Donath, Landsteiner was able to show that the serum of a person suffering from paroxysmal hæmoglobinuria contained an "autohæmolysin" and that in these cases, in which hæmoglobinuria follows exposure to cold, an iso-antibody is fixed by the red cells at low temperatures and the cells subsequently become hæmolysed, with a resulting hæmoglobinuria when the body temperature is again restored. In 1907, with Müller and Potzl, he found that alcoholic extracts of normal organs can be used in place of the extracts of syphilitic liver or spleen originally introduced by Wassermann as antigen in the Wassermann reaction. Landsteiner's modification is now generally employed, and with his introduction of dark-field illumination for demonstrating spirochætes, forms a noteworthy contribution to clinical methods for the diagnosis of syphilis.

In collaboration with Popper, Landsteiner showed in 1908 that it was possible to infect monkeys with poliomyelitis by the intraperitoneal injection of a saline emulsion of brain or spinal cord obtained from a patient who had died of poliomyelitis. Similar observations were made independently and at about the same time by Flexner in New York. Later, with Levaditi, Landsteiner established that the disease was caused by a specific virus that could not be retained by the usual bacteriological filters.

Obermayer and Pick, in Vienna, had already shown that the specificity of proteins could be changed by simple chemical treatment, and had concluded that specificity was closely associated with the chemical structure of the molecule, when Landsteiner commenced work on the formation and specificity of the so-called complex antigens in which a specific group of known constitution is introduced into a protein molecule. It was in the course of this work that he showed that whereas a large colloidal antigen molecule is necessary for the development of a specific precipitation reaction, relatively simple molecules, with a chemical structure similar to that of the antigenic complex, can interfere with the combination of antigen and antibody molecules and prevent precipitation. Inhibition reactions of this type have been of immense value in enabling workers studying the specificity of natural and artificial antigen-antibody reactions to ascertain the influence of certain small groupings of known chemical constitution on the specificity of the antigenic structure as a whole.

In 1908, Landsteiner had been appointed pathologist to the Wilhelmine Hospital; but after the last war, partly because of the difficulty of living conditions in Austria, he decided to leave his native city and to seek a livelihood elsewhere. First he went to Holland, where he was appointed pathologist at the R. K. Ziekenhuis at the Hague in 1919, but a few years later he accepted an invitation to become a member of the Rockefeller Institute for Medical Research in New York.

About this time his studies were mainly concerned with the general nature of the Forssman antigen and he showed, in collaboration with Simms, that whereas an alcohol-soluble extract of horse kidney is almost devoid of power to induce the formation of heterogenetic antibodies, the extracted material can be converted into an efficient antigen by mixing it with protein solutions such as normal serum. Some time later Landsteiner and van der Scheer concluded from a study of the antigens of red corpuscles that, since the whole corpuscles are more apt to incite antibody formation than are extracts, the proteins of the stromata must play an important part in the process of immunisation. We find in the account of this work, which was published in 1925, that the antigenic structure of red cells is clearly expressed in terms of non-antigenic haptens and cellular proteins.

By this time it was generally accepted that serological specificity depended on the chemical constitution and spatial configuration of the reacting groups, although n formal conclusive evidence for this conception had bee produced. Landsteiner and van der Scheer planned to secure this evidence: they prepared artificial antigens from the *d* and *l* forms of phenyl (*p*-aminobenzoylamino) acetic acid and showed that the *d* and *l* immune sera differentiate clearly between the *d* and *l* acids as well as between the *d* and *l* artificial antigens. These brilliant experiments definitely proved that the steric configuration of antigenic groups is one of the factors that determines serological specificity, and it was suggested that the fact that *d*, and *l* steric isomers are acted upon selectively by immune sera may play a significant part in the specificity of carbohydrate molecules such as those discovered as specific components of bacterial antigens. Further evidence in support of this idea was obtained with immune sera prepared against artificial antigen composed of the *d* and *l* forms of tartaric acid. Durin the years that followed, many papers appeared fro Landsteiner's laboratory dealing with the specificity antigen-antibody reactions and the correlation of spec ficity with chemical structure.

Soon after Landsteiner settled in America he returne to the study of the human blood-groups that he had s brilliantly begun a quarter of a century earlier. Wit Levine, he described further differences in human blood the M and N agglutinogens, which although of only mino significance in the technique of blood-transfusion, ar nevertheless of considerable importance in forens medicine and in marking erythrocytes for immunologica studies, especially in those investigations that deal wit the survival of erythrocytes in vivo. The extensi employment of blood-transfusion made it probable tha reactions not attributable to the known ABO pattern erythrocytes and their homologous iso-agglutinins woul be encountered sooner or later and would suggest t presence of unidentified agglutinogens in certain red cel and of the corresponding iso-antibodies in the serum persons not possessing the agglutinogen. And indeed, qu recently, a new blood-group antigen has been describ by Landsteiner and Wiener—the antigen known as t rhesus (Rh) agglutinogen because it was first found in red cells of the rhesus monkey. This antigen is contain in the red cells of about 85% of human (white) subjec and its activity in inducing the formation of Rh immu body when transfused into Rh-negative recipients h to be carefully considered. Its importance is ag evident when it is realised that in 90% of cases in the newborn infant is affected with erythroblast fœtalis, the mother is found to be Rh-negative and infant Rh-positive. Apart from the additional in transfusion therapy resulting from a knowledge of t presence or absence of the Rh agglutinogen in human erythrocytes. this research has given us a further means of making a finer and more exact differentiation of human blood types.

No more than a passing reference can here be made to Karl Landsteiner's important studies on the blood-group factors in human and horse saliva and in hog gastric mucin, his researches on skin sensitisation of animals with simple chemical compounds such as 2 : 4 dinitrochlorobenzene, and the relation of this work to contact dermatitis. He was awarded the Nobel prize for medicine in 1930 for the discovery of the human blood-groups and was elected a foreign member of the Royal Society in 1941.

W. T. J. M.

FACULTY OF RADIOLOGISTS

At the annual meeting in Oxford on July 2–3, Dr. Ralston Paterson was installed as president He expressed the faculty's gratitude to Dr. Cochrane Shanks, the retiring president, whose leadership had been an important factor in improving and consolidating the position of the faculty. Dr. Paterson suggested that the radiologists of Britain should remember how fortunate they have been in being able to plan for the future secure in the continuity of their knowledge The advances must, as far as possible, be made available to our friends and allies in occupied Europe, whose centres of learning have been destroyed, their plant and radium stolen and their workers scattered, many never to return The first essential would be a central

opting centres in the occupied
for instance might adopt
lopt Amsterdam, while London might help Paris or such Russian centres as Leningrad and Kharkov. As soon as it became possible the adopting centre would send plant and accessories, supply workers to assist in reorganisation and accept doctors and technicians from the allied centre for training, all at the expense of the adopting centre. In China a service must be built up practically from the beginning. Germany must wait until others have been served, but we still remember that we once had friends there. To do all this the help of our American friends is essential; their generosity can be trusted to bring them in as senior partners. The project would be a basis for a new International Radiological Society possibly with an international congress in London to

his work as chairman
he Nuffield Provincial
ospitals Trust

Prof. J. A. Ryle urged that when new diagnostic methods are used, particularly when they are of the type called mass observation, the greatest care must be taken to prevent mistakes in interpretation which if applied to the large numbers concerned may have disastrous results. Mass miniature radiography of the chest is such a method and too much reliance should not be placed in it unless the findings are supported by a carefully taken history and full clinical examination Before such use is made of the method to detect pathological conditions several series of persons believed to be in normal health, such as students, should be examined to establish standards for comparison

Dr. A. E Barclay, whose remarks were commented in our leading article of July 17, said that far too little is known of such normal standards. In the early days of radiography of the alimentary tract it was found that the appearances often did not coincide with the teaching of anatomy founded on the position of the organs after death; as a result, many operations were performed for the fixation of organs which were in fact perfectly healthy Again a mistaken interpretation of the shadows seen at the hila of the lungs caused the diagnosticians to announce the discovery of hilar tuberculosis, and many persons who did not suffer from tuberculosis spent months in sanatoriums To prevent such mistakes recurring he proposed that an institute of normal radiology should be set up for the special study of the normal person The medical schools also should make more use of radiography in the teaching of anatomy and physiology.

MIXED SALIVARY TUMOURS

The therapy section, with Prof. B. W. Windeyer in the chair, heard a series of papers on the diagnosis, classification and treatme
Mr. Reginald Payne ac
of these tumours as benign,
The mixed salivary type is the most common, but a number of other tumours are found, particularly in the parotid, where lymphangiomas, lipomas, adenolymphomas and sarcomas may arise. The sites are in the salivary glands, the antrum, palate, alveolus and pharynx Mixed tumours may become malignant, but malignant tumours of the salivary glands are more often adenocarcinomas or squamous carcinomas, malignant from the beginning, and producing metastases. The treatment of benign and semi-malignant tumours is surgical, but preoperative radiation often reduces the size of the tumour and increases the thickness of the capsule, making operation easier.

Prof. W. D. Newcomb said it was now agreed that mixed salivary tumours are epithelial and that the appearance which has been taken for cartilage formation is due to a degenerative process. A myxomatous substance appears and cells wander into this and swell up to resemble cartilage cells, further degeneration results in cyst formation It is difficult for the pathologist to help the clinician to decide on methods of treatment because he seldom knows what has happened to the patient, and cannot, therefore, relate his findings to results. He appealed for more cooperation between the clinician and the pathologist.

Dr. Margaret Tod presented tables showing the results of the method of treatment used at the Holt Radium Institute. For convenience parotid tumours were discussed separately from mixed salivary tumours in other sites The parotid tumours were subdivided according to the method of treatment Between 1932 and 1937, 95 tumours of the parotid of all types had been treated, and of these 76% were well 5 years later. The method of choice is surgical excision followed immediately by radium implantation, of 52 cases so treated, 98% were well at 5 years, while of 32 cases treated by radiation alone, on the whole a more advanced type, 71% were well at 5 years. Cases diagnosed from the beginning as adenocarcinoma or squamous carcinoma, and those which developed metastases within a year, had a bad prognosis The institute treated 46 tumours of mixed salivary type, benign and malignant, in sites other than the parotid, and of these 48% were well at 5 years She believed that the correct method of treatment is to restrict the volume irradiated to the least which contains the entire tumour and then to deliver the highest dose which the irradiated normal tissue can tolerate in the overall time selected.

Dr. Manuel Lederman agreed that surgical excision combined with radium implantation is a satisfactory method of treatment For large tumours and for those of a more malignant type radium beam therapy is most successful The fields are carefully plotted and arranged
om multiple portals A series
. the excellent results obtained

ATYPICAL PNEUMONIA

The diagnostic section, with Dr. E. Duff Gray in the chair, discussed primary atypical and other unusual forms of pneumonia. Colonel R P. Ball drew attention to a number of acute infections resembling pneumococcal pneumonia probably due to a virus and found among Service patients, most commonly in Americans Severe headache is a feature, cough but no rusty sputum and a moderately raised temperature falling by lysis It does not respond to sulphonamides An opacity may be found at one base, and as this clears up another appears at the opposite apex, but the picture is simply that of a pneumonia.—Major Eric Samuel showed X-ray films of the condition and gave some histories illustrating the spread of the infection —Dr F. H. Kemp discussed staphylococcal pneumonia, a dangerous condition which so far has not responded to sulphonamides.

In England Now

A Running Commentary by Peripatetic Correspondents

Now that the decadent plutocracies are invading Sicily it is nice to recall that it was at Enna that Pluto, brother of Neptune, is said to have done the dirty on the daughter of Ceres, thus providing Scheffel with a plot for his powerful novel, *Ekkehard*; also that the Greeks founded the cities of Syracuse, Catana, Gela, and Agrigentum, all about 700 BC; that the Carthaginians held a large part of the island and the Ostrogoths after them; that Belisarius annexed it to the Byzantine Empire for 300 years, when it was taken by the Saracens; and that Musso's momentary blight was so short that it will not be recorded in history. Great ghosts walk the island, phantom armies of great nations; it is one of Nature's seed-beds for cross-fertilisation. Man was ever thus, slinging his sagging hammock between the great ones of the past and the best he can imagine in the future, the projection figures of his mass mind. It is heroes yesterday and heroes tomorrow, but never except for propaganda purposes heroes today. Yet I reckon the sound of the popping of ghosts' eyes drowned the song of the surf when that great armada stood revealed by the Sicilian dawn; I reckon that Belisarius himself would feel foolishly infantile before the staff work of Eisenhower; and I know that the warriors from West Ham or the English counties, from East-side or the Middle West, from Montreal or Winnipeg are better men and better soldiers than all who've gone before.

* * *

This is the story of John Jones, a railway worker. On such and such a day he was about to load coal into an engine when something struck him violently in the back of the thigh. Since an air-raid was in active progress he had no difficulty in diagnosing that he had been hit by a bullet—as a matter of fact, it was a cannon shell. *His immediate reaction was an overmastering sense of* the importance of getting to his feet again. Perhaps he really wanted to seek shelter but he does not remember this. He crawled towards a heap of coal dragging his wounded leg. Reaching up he took hold of a tuft of grass growing on the old coal heap. It gave way and he recognised that it was foolish of him to think that it would support his weight. A lot of coal was brought down, and a lump, as he supposed, hit him in the back; it was really another enemy missile. He now had a deep flesh wound of his thigh and a hæmopneumothorax, but he did not give much attention to them as his mind was now occupied by the strange phenomenon of an engine rocking on its rails. He had scarcely appreciated this when he rose bodily into the air, turned two complete somersaults and then paused suspended over the earth (this was the first bomb). Then he turned two more complete somersaults (a second bomb I suppose) and fell to the earth "like a rocket." After that he remembers only being picked up and sent to hospital. All this was four months ago. His lungs are normal now, although the removal of a piece of rib allows queer respiratory pulsations in his side. His leg is healed, with some loss of muscle and a calcifying hæmatoma in, under or over the periosteum. But he says his nerve has gone and the sound of sirens upsets him—a thing which never happened before.

Another victim of the same raid was working in a *place with a glass roof. Above this roof an enemy* bomber saw fit to explode owing to the attention of our AA batteries. The roof fell and so did the workman. He also remained fully conscious but his mind was occupied, to the exclusion of all lesser matters, by the fact that he was a voluntary stretcher-bearer in the works and must get to the stretchers. He therefore walked and climbed across debris until he gained the distant end of the workshop. There he was placed on a stretcher and taken to hospital. He had comminuted compound fractures of three metatarsals in one foot and one in the other, as well as some twenty or thirty other minor wounds, the worst being a perforating wound of the knee-joint. How did he do it? I don't know, but he says that his nerves are in no way affected, nor do they appear to be. It should be recorded that the knee is normal again and one foot is pretty good, but the other, although healed, would be better amputated.

I feel sure there are several lessons to be learnt from these two cases, but am less sure what they are. But some stick out a mile—impossibilities keep on happening, and man is not such an earthworm as Hitler thinks.

* * *

My experience of the human form—in a professional capacity—having for nearly three years been limited to the adult male, it was with some apprehension that I learnt I was to be a judge at the forthcoming baby show the high spot of Wings for Victory week in the villag *outside the camp.* Feelings run pretty high about thi sort of thing, and I was caught nicely between two stools. It was the villagers' show and they would naturally expect their offspring to win; but the Mess is not without its complement of proud fathers, who made it devastatingly clear what would be the result of an adverse decision on my part. With my colleague, also a martyr to the Cause, I studied the *Instructions to Judges* with growing bewilderment: "Great importance should be attached to the spring and elasticity of the baby." Clearly, this had something to do with bouncing babies, but neither of us could remember seeing an elastic one and even Truby King did not help much. A hundred marks had to be allotted for "Mothercraft'. Obviously, no mother was going to belittle her own parental prowess, so we reduced it to the acme of objective simplicity; twenty-five for [illegible]; [illegible] five each for vaccination and [illegible] and twenty-five bonus for the first mother to use a cli on the ear as a deterrent to howling. This schem *worked admirably in practice, though one rather de* father looked somewhat astonished when asked if hi child was breast fed, and nobody got the bonus.

We arrived to find seventy-three candidates of assorte sizes and a rather harassed assistant MOH, who though he was the only judge. With considerable adroitness we palmed him off with the "under nine months" while we started on the "three to five years," saying that we would be quicker if we worked as a pair. There followed a ghastly procession of indignant children, all "beautifully trained—never a moment's trouble" (difficult to credit in some cases). Some were easy; rickets, rashes undescended testicles and one congenital heart quickly reduced the field to four. After that it became a cas of every man for his favourite. I backed an aggressive looking youngster who had obviously stepped straigh out of "Our Gang." He maintained a dignified silenc throughout, which I thought betokened a fine inde pendent spirit. My colleague said it was mental back wardness and supported an attractive little girl of fi with horribly affected speech (sex again, even at a bab show). We were both wrong; my lad was Welsh an couldn't understand us.

With acute ventricular fibrillation I stepped on platform to announce the winners. Seventy-odd pote tial life-long enemies glared threateningly at me. In cracked, lifeless croak I announced the winner. Th was a malignant silence—we had picked a child from hated neighbouring village. A bad slip that, but might still recoup. Hastily I gave them the runner (my favourite, incidentally). There was a derisive ro of outraged propriety—we had given a prize to illegitimate child of the Bad Woman of the vi There was only one thing to do, and we did it, leavin stethoscope behind in our haste. It has not be returned and I am still afraid to ask for it; it has pro ably been impounded as a reprisal. I wish now that had given him first prize.

* * *

One of the delights of a town garden is a feeding and bath for the birds. Here one can make many frie in all seasons, even in summer when their natural f is abundant. Yet it saddened me the other day to co across a young blackbird demolishing my best str berry. This I thought was a *breach of contract* desp the fact that she was only young. For she it must h been, so assuredly coy, that when I advanced full wrath, she looked up, saw it was only me, and went eating. Later on, however, when I saw her sitting the edge of the then empty tray, preening her feat and exploring her axillæ with great fervour, I was o joyed. "Urticaria," I muttered revengefully, th reason tugged at me, whispering "Fleas."

Parliament

FROM THE PRESS GALLERY

Government Inquiry into Decline in Birth-rate

Group-Captain J. A. C. **Wright**, who opened the debate in the Commons on July 16 on the trend of population, said it would be a stupid waste of material and energy to lay down a long-term policy for a vast increase in facilities for child welfare if within a generation the children were not there and it was found that what was really needed was a vast increase in facilities for tending the aged. We had over 2 million fewer children under fourteen and 2½ million more people over sixty than we had in the last war We had 1½ million fewer children than we had at the time of the Boer War. In fact we had fewer children than we had had in any year since 1876 when the total population was 24 million In 1971, although the population would be approximately the same, there would be 50% more people over the age of forty-five than today and 100% more people over sixty-five To balance that, the number of people aged forty-five and under would be only three quarters what it was today. He agreed with Sir William Beveridge that in 1960 we should be in a panic about the population of this country, and with Lord Keynes [illegible] [illegible] [illegible] to be shown by those at the top of the social scale He advocated family allowances and the provision of houses with labour saving devices to accommodate families, and there were murmurs of approval at his suggestion that landlords should be prevented from refusing tenants with children.

Miss E **Rathbone** bluntly stated that one of the reasons why the birth rate had lately shown a tendency to rise was that a good many women, and still more their husbands, saw in children a way of evading war service We were not likely to hold our Empire if the nation continued to be composed mainly of families with one or two children. She belonged to those who did not want to see Britain become a second- or third-rate power. She suggested six remedies . family allowances , educational propaganda , better housing ; improved communal services, more school meals, milk and so forth, and nursery schools ; better education for future motherhood , and gı [illegible] foreign stock. [illegible] ould be enou [illegible] ublic, and th [illegible] the Goverm [illegible] then appı [illegible]

[illegible] Wright contended that it was no use appealing for an increase in the birth-rate unless mothers and fathers were given proper conditions in which they could bring up their children. There was urgent need for legislative protection for women who had no means of looking after their children while they were at work, and who had to go back to the factory too soon after childbirth.

Mr. D. L. **Lipson** felt that people had not forgotten that there were 2 million out of work before the war. He did not believe that the tendency towards smaller families could be reversed. But there were large numbers of men and women, exiles from other lands, who who would make excellent citizens and bring up children the Government would take a generous view of immigration. Captain G. S. **Elliston** said that scientific investigation was needed into many aspects of the population problem, including the long-term effect of contraceptives. Scientists, as far as he knew, had not yet reported whether the use of contraceptives was rendering women less liable to pregnancy when that condition was desired Sir Edward **Grigg** said that prenatal care and advice was vital, and he strongly criticised the action of certain local authorities in using child-welfare centres for ARP, civil defence and other purposes.

Dr. Edith **Summerskill** asserted that it was the woman who decided the size of a family, and where women in the home had been able to think, read and write, and to compare their lot with that of other workers, they were in a condition of silent revolt. Motherhood was the first occupation to be reserved in this country and the last to obtain any recognition in war time Women were unable to get accommodation in maternity hospitals Queen Charlotte's Hospital was turning away 200 expectant mothers a month, yet the Government did nothing Although she had submitted evidence to the Ministry of Food a year ago from hospitals showing that the pregnant woman was under-nourished, only last week, after four years of war, did the Government recognise that the pregnant woman was trying to sustain two lives on one ration. Anæsthetics were introduced for midwifery a hundred years ago, but today 75% of women had their babies in primitive conditions. The solution of this matter was not to be found simply in an improvement of the social services , the root was economic and the wife and the mother must be given a legal right to a share of the family income.

Sir Francis **Fremantle** said the results of a declining birth-rate would be shown in the loss of leaders If the present birth-rate had obtained years ago the country would have been deprived of such well known people as Sir Walter Scott (a ninth child), Samuel Taylor Coleridge (a tenth child), Darwin (a fifth child), John Wesley (a fifteenth child) and Charles Wesley (an eighteenth child) We should never have had Livingstone, Tennyson, James Watt, Wellington or Nelson, and, most important of all, Lord Randolph Churchill, and therefore we should not have had the present Prime Minister to save the world and civilisation after Dunkirk. But Sir Francis did not advocate families of eighteen and twenty children , the idea should be to encourage families of four and five. He considered that the use of contraceptives for the natural and proper spacing of families was right ; indeed it was enormously helpful when properly regulated But prohibition would be bad. One of the reasons why the medical profession were so alarmed was that the use of contraceptives was believed to be, to a great extent at any rate, responsible for much of the unwanted sterility at present. It seemed clear that the virgin womb was largely affected by contraceptives with a sterilising result. If that was proved true it should be preached right and left to the lay mind. One of the lines of inquiry should be the desirability of prohibiting the distribution of contraceptives to the unmarried, at any rate under a certain age. They should be distributed only under a certificate from a justice of the peace or a medical practitioner. The main cause of the decline in the birth-rate was that the family instinct was gradually being suffocated by the love of comfort and pleasure. Primarily the women in the industries and professions wanted to earn money That was not compatible with family life The remedy must be found mainly in public opinion.

Mr. Ernest **Brown**, in replying to the debate, said that running through the speeches there was a note of concern, of questioning, of suggestion and an almost universal note of humility. No speaker had given the idea that he or she had a clear-cut solution Whether this apprehension was well-founded or not, there was little doubt that it had been heightened by the steep and long-protracted fall of the birth rate between 1876–80 and 1933 But it was a misreading of the situation to regard the reproduction rates of the nineteenth century as normal. In Great Britain the population was more than trebled during t [illegible] ubstantially increase [illegible] 17 million, with an [illegible] ntemporary record For the rate of growth to have continued indefinitely at the nineteenth-century rate would have meant the totals rising to 111 million by the year 2001, and to more than 300 million by 2101. A check was inevitable sooner or later. He did not say that the check had not gone too far—perhaps perilously far—but there was no justification for the expectation of a further decline in the birth-rate solely by reason of what had happened in the different circumstances of the past. He did not think very much of a plain call for more babies ; more and better babies were wanted, and at present we were getting them The steady development on sound lines of the maternity and child-welfare service was one of our most significant achievements in the years between the two wars, and that service was now standing the nation in good stead. As to the point raised by Sir E Grigg, the immediate needs of the war must come first, but when they had been met he would certainly give high priority to the maternity and child-welfare service. Looking at the maternity picture as a whole Mr. Brown said the vital statistics affecting mothers and young children had improved. Last year in England and Wales there was the lowest maternal mortality-rate on record, the lowest stillbirth-rate, the lowest infantile mortality-rate and the lowest death-rate from diphtheria. It was the Government's intention to institute an inquiry on the broadest basis into the whole question of birth-rate and population. It was recognised that no such inquiry would be complete or valuable without the fullest participation of women, and in particular of women who themselves had had experience of motherhood.

Health of the Mercantile Marine

Speaking in a debate on postwar shipping policy in the House of Commons on July 14, Mr. NOEL-BAKER, parliamentary secretary to the Ministry of War Transport, said that vast progress had been made in promoting the health of the British Mercantile Marine since war began. The supply of drugs in ships had been improved. There was a scheme for training stewards to whom it fell to look after the sick. Pamphlets and leaflets of instructions had been issued and they had established—this was a precedent—an anti-malaria officer in a West African port. There was still a long way to go and he believed that this was a field in which international cooperation might produce big results.

QUESTION TIME

Pension Appellants and Medical Reports

Mr. S. J. PETERS asked the Minister of Pensions whether, under the new arrangements to be made with regard to appeal tribunals, he would make it possible for the appellant to have the right to have copies of medical reports and other evidence in the possession of the ministry so as to prosecute his appeal, or before the elapse of time by which a decision must be made whether to appeal or not, as, in many cases, this evidence might obviate an appeal and, in other cases, provide missing links of evidence vital to the appellant's case.—Sir W. WOMERSLEY replied: Any person who exercises the right of appeal to the independent pensions appeal tribunal will be supplied, as in the past, with a statement of the facts relating to his case. The form of the statement is a matter for consideration and may be dealt with by the rules to be made by the Lord Chancellor. I cannot undertake to furnish any such statement before an appeal is lodged.

Army Specialists

Mr. T. E. NAYLOR asked the Secretary of State for War if he would give a list of the various categories of medical specialists, namely, physiotherapists, psychiatrists, &c., employed in the Army medical services; and whether their duties were confined to the particular class of cases in which they specialised or were extended to ordinary medical examinations.—Sir JAMES GRIGG replied: The following categories of specialists are employed in the Army medical services: physician, neurologist, physical medicine, dermatologist, physiologist, pathologist, psychiatrist, venereologist, hygiene, malariologist, entomologist, surgeon, radiologist, ophthalmologist, oto-rhino-laryngologist, anæsthetist, neurosurgeon, maxillo-facial surgeon, orthopædic surgeon, and gynæcologist. They are primarily engaged on their specialist duties. If there happens to be a shortage of general duty officers, they may, however, be required in addition to undertake general medical duty.

Mr. RHYS DAVIES: When was the first psychiatrist appointed during the present war; how many were there now in the service; and how many men had already been discharged from the Army consequent upon examination by psychiatrists.—Sir J. GRIGG: There were psychiatrists serving in the RAMC many years before the war, but the first new appointment after the outbreak of war was made on Sept. 8, 1939. There are 198 now serving. Since the beginning of the war about 23% of those discharged from the Army on medical grounds have been discharged for psychiatric reasons.

Medical Attendance for Soldiers' Families

Mr. F. J. BELLENGER asked the Minister whether wives and families of regular soldiers commissioned from the ranks were entitled to free medical attendance.—Sir J. GRIGG replied: No. The privilege of free medical attendance is given only to the wives and children of soldiers serving on a regular Army engagement or to the wives and children of officers holding permanent Army commissions.

Medical Examination of Recruits

Mr. RHYS DAVIES asked the Minister of Labour whether medical boards were made familiar in any way with the intensive training expected of men in a modern army when they examined them for military service.—Mr. E. BEVIN replied: No. The medical boards' decisions indicate whether or not in their opinion a man is capable of undergoing physical exertion involving severe strain, and the allocation of men to the various corps by the Army authorities is made in the light of this and other relevant information.

Tomlinson Report

Mr. E. BEVIN informed Mr. B. Y. KIRBY that the proposals in the Tomlinson Report relating to rehabilitation and training of disabled persons were already being implemented in modified form and the arrangements proposed were being made as rapidly as war-time circumstances permit. The proposals relating to resettlement of disabled persons in employment after the war were now under consideration He was in consultation with representatives of industry and awaited their reply.

Training of Deaf and Dumb Workers

Mr. JOHN DUGDALE asked the Minister whether his attention had been called to the experiment being successfully carried out in a Black Country foundry whereby deaf and dumb men were being trained under their own leader to do specially suitable work of national importance; and whether he would consider extending such a scheme to other districts.—Mr BEVIN replied: I am watching that experiment with interest and in the light of experience shall be glad to consider whether it could be extended so far as there is need for it. In present circumstances, however, there is no great difficulty placing able-bodied deaf and dumb persons in work.

Training VADs as Nurses

Sir IAN FRASER asked the Minister of Health if, in view of the shortage of nurses, he would arrange for suitable Voluntary Aid Detachments who had substantial nursing experience to qualify for state nursing examinations after a shortened course, reasonable credit being given to them for their VAD experience.—Mr. BROWN replied: This is primarily a matter for the General Nursing Council, who, I understand, already have it under consideration.

TT and Attested Milk Producers

The estimated numbers of wholesale producers and producer-retailers of milk of tuberculin-tested and attested standard on June 1, 1943, were 2280 and 1030 respectively. The corresponding figures for 1942 were 2190 and 1110. (Mr. W. MABANE in reply to Major C. YORK.)

INFECTIOUS DISEASE IN ENGLAND AND WALES

WEEK ENDED JULY 10

Notifications.—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 1959; whooping-cough, 2284; diphtheria, 580; paratyphoid, 12; typhoid, 8; measles (excluding rubella), 3593; pneumonia (primary or influenzal), 502; puerperal pyrexia, 125; cerebrospinal fever, 19; poliomyelitis, 6; polio-encephalitis, 2; encephalitis lethargica, 2; dysentery, 93; ophthalmia neonatorum, 82. No case of cholera, plague or typhus fever was notified during the week.

The number of civilian and service sick in the Infectious Hospitals of the London County Council on July 7 was 1624. During the previous week the following cases were admitted: scarlet fever, 140; diphtheria, 50; measles 12; whooping-cough, 31.

Deaths.—In 126 great towns there were no deaths from measles or scarlet fever, 1 (0) *from an enteric fever*, 8 (2) from whooping-cough, 13 (1) from diphtheria, 12 (10) from diarrhœa and enteritis under two years, and 9 (1) from influenza. The figures in parentheses those for London itself.

Manchester reported the fatal case of enteric fever. There were 7 deaths from diarrhœa at Birmingham.

The number of stillbirths notified during the week was 172 (corresponding to a rate of 26 per thousand total births), including 20 in London.

Letters to the Editor

THE BROKEN HEEL

SIR,—In your annotation of July 3 you say that Bohler's method of treating the os calcis fracture has got a bad name. As an old disciple of Bohler with some practical experience of his methods I cannot let this pass without a word in his defence. Among the employees of a large industrial concern I have had to treat about a dozen os calcis fractures, and in every case I have used Bohler's method of reduction and fixation. Every one of them has returned to full work inside twelve months and in most cases to partial work long before that. In no case has the firm been called on to pay compensation for permanent disability.

plaster without reduction and such procedures as subastragaloid arthrodesis—are surely confession of failure. The difficulty is, of course, an accurate restoration of the articular surface, but one does not for example excise a knee because a fracture has destroyed the continuity of the articular surface. I contend that failure in most cases is due to lack of care. Bohler lays down rules which may be modified in some cases. I find that a transfixion pin through the lower third of the
ndesirable. Instead I use a
ong enough to withstand the
usually about 30 kg. and
e is often difficulty in trans-
he tibia with a Steinmann's
y hard, and hammering may
easily crack it, while drilling through such narrow bone makes an
allows play. I
discussed th
l he had come to
the same co
needs to be very thick (¼ in.); anything else will bend. The pin needs accurate placing both with regard to the ideal point of mechanical advantage for the particular fracture and in relation to its direction. It must be normal to the anatomical axis of the os calcis and not to the apparent axis. When traction is applied reduction must be patiently checked by X rays, and Bohler's critical angle must be carefully measured and compared not with any arbitrary standard but with the sound side. In a double fracture one must use one's judgment. The redresseur should be used in every case, but it will fail if the os calcis pin is badly placed.

I use a plaster cast with full extension still applied in the axis of the leg. I always apply a turn of elastic plaster bandage round the ankle-joint but use no other padding. There is thus one pin in my original plaster and this remains in for 6 weeks, a walking appliance being superimposed. There is usually pain for about 48 hours after the operation, during which the patient remains in bed on a Braun frame. I control pain freely with morphine, at the san
carefully. After 6 weeks
he pin, and at this stage I
eturn to alternative employment. After a further 6 weeks the second cast is removed, and it is often necessary to keep the patient away from work for a few days. Active m
nce and as soon
ut the treatment
nan. He is allow
nd to mix freely with his workmates. When he is at work he earns wages on the scale of his normal basic rate and this maintenance of earning capacity does much to maintain a bright outlook on life.

Northwich, Cheshire. A. H. BENNETT.

LANATA AND PURPUREA

SIR,—Your annotation of June 26 does not present adequately the claim of digoxin to a place in the Pharmacopœia. One of the major difficulties in the use of digitalis
galenical
l method.
s by the
sayed on
nimals. But there are special difficulties in the biological assay of digitalis: the value obtained in comparison with the standard preparation is, for some preparations, dependent on whether frog, cat or guinea-pig is used as the indicator of potency. Practising American cardiologists are coming to the conclusion that the assay by intravenous injection into cats gives the best available estimate of potency for human patients, but
official in
various parts
alt to use
cats for assay,
od.

Though subject to occasional error of indeterminate magnitude, the assay is nevertheless of considerable value because it prevents the sale of entirely worthless products and generally gives a fair approximation to the clinical potency. It is obvious, however, that a preparation which needs no biological assay is preferable. The only *BP* preparation of digitalis—and perhaps the only preparation now available—which meets this requirement is digoxin. This drug can be characterised entirely by chemical and physical constants, and the practitioner can therefore prescribe it in the assurance that he has for practical purposes eliminated one variable in his treatment—the potency of successive batches of the preparation used. The variability in the response of patient
drugs generally is no
excuse
variation in the drug
used;
ation of digitalisation
is required. He can also be assured that he will at least attain as good control of his patient's condition with digoxin as with any other digitalis preparation, and a fair proportion of clinicians assert that its action is quicker and more easily regulated than that of digitalis leaf or tincture.

The intravenous use of K strophanthin is also to be deprecated, since a crystalline strophanthin not needing biological assay—namely, ouabain or G strophanthin—is available if there is a real distinction between the clinical action of digitalis glucosides and strophanthins. G strophanthin is the official preparation in Germany, and I have never been able to understand the English clinicians' preference for the use of such a poorly defined mixture as K strophanthin. Strophanthin preparations are so poorly and irregularly absorbed from the alimentary tract that they should never be given by that route.

Wellcome Physiological Research
Laboratories, Beckenham, Kent. J. TREVAN.

THE PROPER PLACE FOR CHILDREN

SIR,—If it were true, the suggestion of the House Governor of the Birmingham Children's Hospital that
the country are "bad" ones
ere are the same number of
s would be the most appalling
life that has ever been made.
For London it is not true and I do not believe it is so for any part of the country. The young parents of today are putting more thought
of their children than an
concord between man and
of a good home is above reproach in the great majority of all families throughout the nation Mr Shrimpton

Guy's Hospital. T. B. LAYTON.

PELLAGRA AND MENTAL DISORDER

SIR,—As a matter of historical interest, it was not just before the present war (as your leading article suggests), but in 1913, before the Great War, that sporadic cases of pellagra began to be recognised in England,[1] not only in rural districts but also among hospital patients and, not infrequently, in asylum inmates. The suspicion of a dietetic origin was strong, and occasional association with scorbutic symptoms had been noted. Also within a short time I had seen pellagra in association with œsophageal obstruction and gastric disease. The recognition of vitamin deficiency, of course, came later.

Harley House, N.W.1. CHARLES R. BOX.

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[1] Box, C. R. and Mott, F. W. *Trans. Soc. trop Med. Hyg.* 1912–13, 6, 149. Box C. R. *Practitioner*, 1913, 90, 940; *Brit. med. J.* 1913, ii, 2; *Ibid*, 1914, ii, 397; *Med. Pr.* 1914, 97, 114.

SULPHONAMIDE RESISTANCE

SIR,—Your leading article of July 10 says that "an organism which has become resistant to one sulphonamide is correspondingly resistant to all the others." This may be so in most experiments in the test-tube, but it is definitely not so in the host. I have cured many drug-resistant cases of gonorrhœa and non-specific urinary infections by changing from one sulphonamide to another, especially since sulphathiazole and sulphadiazine became available.

In the investigation of chemotherapy failures most workers consider that the only cause—provided the drug is able to reach the organisms—is a resistant strain (drug fastness). Too little attention is being given to resistance to the drug of the defence mechanism of the host (drug tolerance). In a recent series of cases a large proportion of the strains which were resistant in the host were also resistant in vitro, but in some cases this was definitely not so. One in particular was intractable to treatment by sulphanilamide, sulphapyridine, sulphathiazole, sulphadiazine and sulphamethazine though the organisms were susceptible in vitro, the minimal inhibitory concentration for sulphathiazole and sulphadiazine being 1 in 160,000.

I have notes on 85 couples who must have been infected with the same strain of organisms. In 15 instances one or other of the parties was resistant to treatment, but in only 1 instance were both resistant. I have also treated two men and a woman infected with the same strain and of these only one was resistant. In my opinion this is strong evidence, in spite of the laboratory work, in favour of a host factor.

It is also worth noting that, after failure with the more potent drugs, treatment aims at stimulating the defence mechanism of the host. I have previously recommended intravenous injections of 'Dmelcos' or TAB vaccine.[1] It is not necessary for the fever induced to correspond with the thermal death-time of the gonococcus, and during the last two years many excellent results have followed mild protein shock (when there is rarely a rise in temperature) produced by intramuscular injections of a vaccine or 'Aolan.'

Tolerance to the sulphonamides may be natural, but it is often acquired by subeffective and irregular dosage for trivial ailments, and as a result serious infections which develop later may prove resistant to treatment. Local application of the drug without its administration internally may also induce drug tolerance; I have had several resistant cases who gave a previous history of such treatment for skin lesions.

Wimpole Street, W.1. A. H. HARKNESS.

MARCH FRACTURE

SIR,—Since the literature of "march fracture" is growing at an almost alarming rate, it may be well to attempt to rid it of a fallacy that seems at present to be assumed as an unassailable truth. In your issue of July 17, Squadron-Leader Flavell follows Mr. John Bruce, who follows Mr. Dudley J. Morton of Milford, Connecticut, in blaming a short first metatarsal bone for many forefoot disabilities. They blame this bone because one and all assume that "the head of the first metatarsal" is "on the same transverse plane, or even a little more distal, than that of the second." It cannot be insisted too strongly that in the normal human foot the head of the first metatarsal is always behind that of the second and usually behind that of the third. It *is* true that the normal human metatarsal formula is what Morton in his book mistakenly regards as a deformity of "fourth degree shortening" of the first metatarsal, but that does not justify orthopædic surgeons failing to recognise the normal when they see it.

In Squadron-Leader Flavell's figure, (*a*) is said to represent the normal foot; but it is one that no anatomist has ever described or figured as normal and it must be of excessive rarity if it ever does occur. On the other hand, his figure (*b*), stigmatised as defective, would be passed by any anatomist as being normal in this regard. Not one of the 15 feet represented in the accompanying tracings from radiograms would be judged by an anatomist to show "a clear-cut atavistic anomaly" as regards the metatarsal formula. The apparent profundity of such expressions as Morton's "humanoi line" and Morton's "metatarsus atavicus," whe founded on a failure to recognise a very commonplac condition of normal human osteology, fails to be impres sive. Far from the first metatarsal bone equalling "i length the longest metatarsal of the digital segment," i is *always the shortest* member of the series.

Manchester. F. WOOD JONES.

INHIBITION OF PROTEUS IN CULTURES FROM WOUNDS

SIR,—Major Pulvertaft, in your issue of July 3, make a justifiable plea for a standard procedure for the cultiva tion of bacteria from wound swabs. His own method though admittedly incomplete, appears from the contex to be intended as a basis for routine examination.

We would point out that the frequencies of variou bacterial species in the 172 wounds examined by Majo Pulvertaft may be misleadingly low, and the sam criticism would apply to frequencies obtained by an future application of his routine. The original swal and subcultures from anaerobic media, are both plate on alcohol-dried blood-agar. The swarming of *Proteu vulgaris* and the spread of *Ps. pyocyanea* are notoriou handicaps in plate culture, but their inhibition by alcohol drying materially lowers the growth-promoting pro perties of the medium for other bacterial species. Th results of moderate alcohol treatment are so erratic tha a full 3 minutes' flooding of the agar surface with alcoho is necessary to ensure inhibition of swarming. O blood-agar so treated, the partial suppression of growt of many common wound-bacteria is often qualitative obvious. The degree of suppression may be demo strated by counts of graded inocula of freshly isolat strains seeded on to treated and untreated plates. one such test, for example, we found the ratio of numbe of viable organisms growing into colonies on the tw types of blood-agar plate (BAP) were :—

Organisms	Hours Incubation	Counts on BAP	
		Alcoholised	Plain
Strep. pyogenes I	24	0	22,000
	48	0	22,000
" " II	24	40	1,340
	48	45	1,340
Staph. aureus ..	24	20	160
	48	160	160
Cl. welchii ..	48	10	55
Cl. septicum ..	48	3	1,000
Cl. tetani	48	6	30

With prolonged incubation, more colonies appear o the treated plates, but there is, except with *Staph. aureus*, still a high degree of complete suppression of growth. The probability, then, of obtaining a colon from a viable organism present in a sample of exud from a wound may be very small. If only a few bact of a given species are present their colonies might nev appear if alcohol-dried plates were the sole medium.

The modification of the Fry sandwich plate, describ in Appendix, Section 4C of the second edition of Medical Research Council's War Memo No. 2, is a gr help in the aerobic cultivation of proteus- specimens, but clostridia and other anaerobic bacteria difficult to detect in the sandwich. We have teste number of bacteriostatic agents which inhibit swarming of proteus, including sodium azide, pota tellurite and M. 565 (ICI), the sodium salt of the c densation product of beta-naphthol sulphonic acid formaldehyde,[1] but none of them inhibits prot swarming without suppressing the growth of some the bacterial species likely to be found in wounds; that although media treated with alcohol or these agents have their use as additions to routine media, are not suitable as basic media.

One of us (N. J. H.) has recently tested concen agar gels for inhibition of swarming, and has found blood-agar plates made with a 6–8% concentra agar (depending upon the brand of agar emplo inhibit the swarming both of *Proteus vulgaris* a clostridia which form spreading colonies. Comp of counts on the two media show no difference in the numbers of organisms which grow out on 8%, and on the routine 2%, blood-agar. Colonies (24-hour and 18-hour) are smaller on 8% agar, but they are characteristic and recognisable.

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[1] *Brit. J. ven. Dis.* 1940, 16, 215.

[1] Lominski, I. and Lendrum, Alan C. *J. Path. Bact.* 1942, 54,

We suggest, therefore, that if the incidence of proteus in wound material taken in any one theatre of war is likely to be so high that a routine medium for the inhibition of swarming should be employed, the 6–8% blood-agar should be given a trial. We have already used it in the cultivation of a number of wound swabs and found it satisfactory, particularly in the ready separation of mixed cultures of clostridia.

University College Hospital
Medical School, W.C.1.

N. J. HAYWARD.
A. A. MILES.

IDIOSYNCRASY TO PENTOTHAL SODIUM

SIR,—The sequence of events described by Lieut.-Cmdr. Lees (*Lancet*, June 10, p. 788)—viz., severe pain down the forearm and hand with a reddened area of skin—bears such a strong resemblance to the results of the injection of 'Pentothal' into an artery which I recently witnessed, that I venture to suggest that the latter accident was the cause of the incident reported.

I have several times noticed an abnormal artery running obliquely from the antecubital fossa across the ulnar group of muscles, subcutaneously but deep to the superficial veins, and it was into this vessel, whose

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in spurts;

pulsation was then seen, and the rash down the forearm; about 5 c.cm. of 5% solution had been given. The rash soon faded, and no further ill effects were noted.

The case is worth reporting in view of the occasional presence of an abnormal artery below the elbow, and of the fact that gangrene of the hand has been reported as a sequel to intra-arterial injection.

Shaftesbury, 27.vi 43.

R. J. CLAUSEN.

TREATMENT OF OSTEOCLASTOMA

SIR,—Dr. Brailsford, in spite of his great experience, must not assume the attribute of infallibility. What some unnamed orthopædic surgeon may or may not have said at some unspecified date is not good argument.

The radiologists and pathologists with whom I work will support me when I state that the biopsy of certain bone tumours, including suspected osteoclastomata, is a desirable and necessary procedure, in conjunction with the examination of good X-ray photographs. In my hands surgical eradication of osteoclastomata, where technically feasible, has proved satisfactory; but in certain cases I recognise that there are indications for radiotherapy. Amputation is not often necessary. From a scientific point of view, this is mere opinion, but Dr. Brailsford has done nothing to shake it.

There is clearly a need in this country for a central bureau to collect information concerning the pathology, diagnosis, treatment and prognosis of these and other bone tumours. Interested readers may like to know of the bone tumours subcommittee of the British Orthopædic Association, of which the chairman is Prof. Harry Platt and the hon. secretary Mr. H. J. Burrows. But for the war, this committee would probably have been very active on this work.

Exeter.

NORMAN CAPENER.

COLOUR-FILMS IN FIRST-AID TRAINING

SIR,—I can fully confirm Mr. Humble's estimate of the value of colour-films in teaching first-aid. The film, *Bomb Fell*, which Mr. Humble refers to as being purely experimental, has proved of great instructional value.

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Such a film conveys more to the audience in twenty minutes than could be done in half a dozen lectures. I am surprised that the authorities have not yet done something officially on the same lines.

Cheltenham.

R. B. STEWART.

Notes and News

DISABLED NURSES

THE Ministries of Health and of Labour have arranged that State Registered Nurses who on account of disability are not fit to return to their previous nursing work, but who could work as sister tutors, health visitors or industrial nurses, may receive training for that purpose. The Ministry of Health (Circular 2824) has asked hospital authorities to tell nurses who are under treatment about these arrangements and those who wish to apply will be interviewed while in hospital by a representative of the ministry. Disabled nurses not under treatment in hospital who wish to apply should send full particulars to the chief nursing officer and principal matron of the Ministry of Health, Whitehall, London, S.W.1, who will arrange for an interview. Similar arrangements are soon to be made for Scotland.

Disabled nurses not able to take advantage of the courses referred to may apply to the Ministry of Labour for training in some other occupation, either under the scheme for further education and training recently announced by the Government, or under the interim scheme of training for the disabled. Various courses can now be provided, and the disabled nurse may be found suitable to train as almoner, radiographer, masseuse or chiropodist. The cost of training and maintenance allowances will be paid by the ministries concerned.

MEDICAL MAN-POWER IN NORTHERN IRELAND

THE Medical Personnel (Priority) Committee, which was appointed in January, 1942, to consider the most economical allocation of medical man-power in Northern Ireland has presented two interim reports setting out the following conclusions and recommendations:

Figures supplied by

tary basis.

CHANGES IN SCHOOL HEALTH SERVICES

THE white-paper, *Educational Reconstruction* (Cmd. 6458.

6d.), which sets out the Govern-
the national education service,
, but it does foreshadow a wider provision of medical treatment for young people and of school meals. At present local education authorities are obliged to provide for medical inspection of all children in public elementary schools, secondary schools and some others, but they need arrange for medical treatment in elementary schools only, and the scope of treatment offered varies widely in different areas. Eventually school-children will be able to get any form of treatment through the national health service, and local authorities will then be responsible only for medical inspection, but meanwhile it is proposed to make it their duty to provide medical inspection for all children and young persons attending grant aided schools, and to ensure that treatment, other than domiciliary, is available to all who need it. The present power of authorities to provide school meals and milk is to be converted into a duty, and they will be empowered to supply, or help in supplying, clothing and footwear. The white-paper says that substantial modifications will be required in part 5 of the Education Act, 1921, which provides for blind, deaf and other handicapped children, but it gives no details.

University of Liverpool

On July 10 the honorary degree of master of surgery was conferred on Mr. Hugh Morriston-Davies.

At recent examinations the following were successful:

MB

A. B. Concanon, G. Sanderson, Mary D. H. Sheridan and V. K. Summers.

FINAL EXAMINATION FOR MB, CHB

Part III.—Mary A. R. Allan, Muriel C. Andrews, A. Ansell, E. R. Banner, Beryl R. Bentley, R. A. Blyth, N. Broughton, Hilda E. Bullen, W. G. Canning, G. Davies, I. H. Foy, Joan O. Grant, E. N. Hugh-Jones, Eirwen M. Jones, J. J. Lieben, I. P. Madhok, Margaret L. Magee, A. W. Merrick, Joan C. Miller, K. H. Oldfield, E. W. Parry, E. Scott, K. H. Slatter, Nora Taggart and G. A. Wetherell.

Part I.—M. K. Alexander, J. T. D. Allen, E, T. Anderton, H. B. Andrews, Beryl G. Anscombe, G. Ansell, K. W. F. Baruch, J. P. D. Bates, T. J. Boag, Edith M. Brown, E. Cooper, D. Craddock, Constance M. Davis, B. Dover, K. R. Dumbell, E. D. Edmondson, J. L. Edmondson, J. W. L. Edwards, R. Ellam, P. Foster, I. J. C. Frew, B. R. Frisby, S. Gillis, N. J. Gourdji, D. A. Gregson, C. R. Helsby, Winifred L. Hollick, G. Hughes, L. Jacobs, D. C. R. Jones, E. S. Jones, H. A. Jones, J. T. W. Jones, P. R. B. Jones, R. S. Jones, M. Kirwan, W. T. W. Lawson, Joyce R. Lewis, S. Lipton, J. B. Lynch, K. McCarthy, M. G. McEntegart, R. H. Martlew, Lucille F. Morgan, D. B. Mossman, C. M. Ogilvie, C. A. Pearson, H. H. Pilling, J. B. Roberts, Isabel S. Smellie, G. W. Storey, P. J. Taylor, W. A. Thompson, Corris Venables, H. Wickham and J. R. E. Wilson.

University of Edinburgh

At a graduation on July 14 the following degrees and diplomas were conferred:

MD.—J. M. Crawford and E. L. Thomson (commended).

MB, ChB.—T. M. Abbas, T. L. Adamson, W. R. M. Alexander, R. P. Anderson, Catherine O. Bell, W. J. Bell, G. S. P. Birtwisle, J. A. P. Bouton. D. C. Boyd, Janet Braid, J. S. Brown, Scott Campbell, J. A. Caskey, Jessica B. Core, C. M. Cornforth, Bruce Cruickshank, I. M. Cuthill, J. A. Dick, R. W. Draper, G. R. H. Drew, T. B. M. Durie, J. C. Edgar, Rowland Elliot, Constance M. Evans, Ida M. K. Fenton, Mary G. Findlay, J. B. Gibson, G. T. Goodall, Jessie R. Gray, Sarah K. R. Gray, H. M. Guthrie, R. D. Guy, R. R. Hamilton, H. C. Hastings, Lorna H. Heslop, Miriam M. Heughan, Elizabeth M. Hislop, D. R. Hughes, David Hutchison, D. G. Illingworth, W. H. Isles, Isla M. S. Jamieson, J. C. Johnson, Kirsty M. Johnstone, A. H. D. Large, J. H. Lawson, Doreen S. Leith-Ross, Audrey B. Lornie, W. M. M. Lyon, Margaret MacDonald, H. A. M'Dougle, Margaret M. M'Intosh, A. M. macLachlainn, A. M. Macleod, A. T. Macqueen, D. J. L. MacWatt, J. G. Martin, T. S. Matheson, Manuel Mendick, R. C. Milne, Patricia E. Mitchell, R. A. H. Morison, J. A. Morton, Agnes P. Muir, W. D. Munro, William Murdie, Janet T. Murdoch, G. H. Pearson, J. J. Pepper, Margaret G. Proudfoot, R. J. G. Rattrie, Monica M. Renner, Dorothy C. G. M. Reside, Clifford Riley, G. I. Robertson, D. W. Robinson, James Ross, David Savory, D. I. H. Smith, J. G. Sommerville, R. J. C. Southern, Sheena G. D. P. Splitt, Sheila M. Stark, Isabel F. Sutherland, Maxwell Tait, H. B. Taylor, G. H. M. Thornton, A. R. Watson, R. W. Watson, Margaret Watt, Elizabeth G. Watts, T. B. Whiston, J. B. Wilson, L. A. Wilson, Olive Wilson and R. D. Young.

MB, ChB of the Polish School.—Krystyna Albrecht-Berezowska, K. P. Durkacz, J. K. Gaska, Stefan Harasymowicz, Karol Konopacki, Magdalena K. Munk, T. M. Ostrowski, Teodor Radula, Bronislaw Sedzimir, Henryk Seid, Janusz Srzednicki, Wanda H. Wojcik and Boleslaw Zietak.

BSc.—Margaret G. Proudfoot, MB.

DPH.—J. B. Brown, MB, and O. H. Siung, MB (in absentia).

Queen's University, Belfast

On July 7 the following degrees and diplomas were conferred:

MD.—*W. S. Empey and *S. B. Hughes.

MB, BCh, BAO.—Una B. Byrne; James Crilly; Ethel A. Fisher; H. N. Glancy; Borojh Gorfunkle; W. J. B. Higson; E. D. Lindsay; O. W. M'Kee; R. A. M'Keown; Ona M'Millan; Raymond Miller; W. J. Moffett; Hilda A. Reade; Hilda A. Ritchie; J. C. S. Ritchie; Zdenek Steiner; Kathleen H. Stewart.

DPH.—B. R. Henry; Harold Kennedy; J. A. Magee; G. A, Mullan.

* In absentia.

National University of Ireland

Dr. Robert MacLaverty has been appointed professor of midwifery and gynæcology at University College, Galway. The bursary in surgery for 1943 has been awarded to Dr. Eoin O'Malley of University College, Dublin.

Postgraduate Lectures in Edinburgh

The following Honyman Gillespie lectures will be delivered at 4.30 PM, on Thursdays, at the Edinburgh Royal Infirmary, during the summer vacation: Prof. James Young, maternal and child health (July 29); Mr. Duncan Morison, ureteritis (Aug. 5); Dr. J. L. Henderson, infection in the newborn (Aug. 19); Dr. C. M. Scott, clinical assessment of the value of new drugs (Sept. 2); Dr. L. J. Davis, hæmolytic anæmias (Sept. 9), Dr. T. N. MacGregor, uses and abuses of the female [illegible] 16) [illegible]

University of Durham

At a congregation on June 30 the honorary degree of D CH was conferred on Major-General P. H. Mitchiner.

Medical Honour

The George medal has been awarded to Captain C. P. Blacker, MC, RAMC.

A corporal had walked into a minefield and was killed. A Guards officer and a sergeant who had laid the mines at that poi walked into the minefield to bring back the corporal's body. Capta Blacker warned them of the risk, but the sergeant, confident th he knew the positions of the mines, went on with the officer. Th sergeant was killed when he stepped on a mine and the officer was seriously wounded, With no knowledge of the mine pattern an no-one to help, Captain Blacker went immediately to the rescue of the wounded officer. The officer was saved and recovered from hi wounds.

British Institute of Radiology

A special general meeting will be held on Aug. 7, at 2.30 PM, at 32, Welbeck Street, London, W.1. The agenda include the following items:

Proposal for adoption of a postal ballot on major issues of policy and weekly or fortnightly bulletins to members dealing wit these issues; the starting of a correspondence section in the journal of the BIR; consideratio [illegible] the BIR into th present shortage of X-ray [illegible] medical matte be considered and voted upo [illegible] only; considera tion whether it is in the interests of radiologists that the hon medical secretary should be a serving officer in HM Forces.

Hospital Saving Association

This association which has raised £10 million for th hospitals celebrated its coming-of-age on July 15 by pre senting a cheque for £10,000 to the Duchess of Gloucester provide scholarships for the higher education of hospit nurses. The Minister of Health speaking at the birthd party said that "in any comprehensive service we cann do without that spirit of selfless hard work which has bu up the association."

Appointments

Christie, A. F. Mary, MB LOND.: temp. part-time psychiatrist f child guidance clinic, Southend-on-Sea.

Holloway, G. A. F., LMSSA: examining factory surgeon for Bour Lincs.

Roberts, W. Morrell, MD MANC., MRCP: hon. consulting physici to the Reedyford Memorial Hospital, Nelson, Lancs.

Colonial Medical Service.—The following appointments a announced:

Buchanan, J. C. R., MD EDIN, FRCPE; DDMS, Uganda;
Grene, G. D., MRCS: MO, Gold Coast;
Jackson, Esther, MB, MANC: MO, Aden;
Ladkin, R. G., BM OXFD: MO, Uganda; and
Soddy, J. R., MRCS: MO Gold Coast.

Births, Marriages and Deaths

BIRTHS

Binks.—On July 8, in London, the wife of Flight-Lieutena F. Allen Binks, RAFVR—a son.

Copeland.—On July 22, the wife of Dr. F. J. Copeland, of Agus P.O., Hooghly District, Bengal, India—a son.

Evans.—On July 15, in London, the wife of Dr. John Evans— daughter.

Kidd.—On July 13, at Corbridge, Northumberland, the wife Surgeon Lieutenant J. D. Kidd, RNVR—a son.

Macfie.—On July 8, at Ismailia, Egypt, the wife of Major W Gordon-Macfie, RAMC—a daughter.

Mussen.—In Washington, DC, the wife of Surgeon Command R. W. Mussen, RN—a son.

Needham.—On July 7, the wife of Captain F. J. Allport Needha RAMC (missing at sea)—a son.

MARRIAGES

Byrne—Meagher.—On July 3, at Haslemere, Patrick Antho Byrne, MB, surgeon lieut.-commander, RNVR, to Mary Winif Meagher, MB.

Hearn—Cooper.—On July 14, at Padstow, George William Hea MD, major, RAMC, to Ann Cooper.

McAfee—Wall.—On July 7, at West Kirby, Lewis Alexan McAfee, surgeon lieutenant, RNVR, to Joan Vallance Wall.

Slack—Crombie.—On July 15, at Chester, Cyril Charles Sla MB, to Margaret Melville Crombie.

DEATHS

Byrne.—On July 10, in Cairo, Austin William Byrne, CBE, LPOOL, MRCP, DPH.

Duncan.—On July 12, at Higher Brixham, S. Devon, Louis Ins Duncan, MB ABERD.

Lane.—On July 18, in London, Alfred Vavasour Lane, LR lieut.-colonel RAMC, retd.

Mitchell.—On July 2, in Liverpol, Harold Alexander Mitc MD TORONTO, MCPS ONTARIO, aged 52.

Pilcher.—On July 17, at Boston, Lincolnshire, Cecil West Pilcher, MBE, MRCS, aged 72.

The f [illegible] of [illegible] aterials in short supply [illegible]

INJURIES PRODUCED BY BLAST IN WATER

J. C. GOLIGHER, M.B. EDIN., F.R.C.S.
MAJOR R.A.M.C., SURGICAL SPECIALIST

D. P. KING
M.D. CAMB.
MAJOR R.A.M.C.; PATHOLOGIST

H. T. SIMMONS
M.D., CH.M. MANCH., F.R.C.S.
LIEUT.-COLONEL R.A.M.C.; OFFICER IN CHARGE OF A SURGICAL DIVISION

THE term "blast in water" or "underwater blast" refers to the sudden wave of positive pressure that is propagated through the sea by exploding depth charges, mines and bombs. This naturally constitutes a serious danger to shipwrecked sailors who happen to be in the water near such explosions. There are two main ways in which men may be exposed to this hazard. First, an escort vessel or warship may be sunk while it has one or more of its depth charges primed, in which case the charges will explode [illegible] s to the requisite [illegible] e water and near [illegible] blast. Secondly, [illegible] a torpedo or bombing attack on a convoy the survivors from a sinking ship in the water may be injured by the blast from torpedoes or bombs directed at other vessels in the convoy or from depth charges dropped by the escorting ships in their efforts to sink the U-boat. A consideration of the magnitude of the war at sea would lead one to infer [illegible] since the first of these injuries was reported in 1917, not more than 40 have been recorded.[1] This figure is agreeably surprising, but it is almost certainly an underestimate, for many cases probably die in the water and never reach hospital, while others are only slightly hurt and recover rapidly and spontaneously without arousing much medical interest.

In the published cases the following were the salient features. The part [illegible] not the chest, as [illegible] only a proportion [illegible] of a chest lesion, [illegible] an abdominal injury. The [illegible] hibited exactly the same clinical [illegible] ced by blast from aerial bombs. [illegible] injuries were concerned the cases [illegible] ould be divided into two groups. In one the injury [illegible] small [illegible] local [illegible] by laparotomy and suture where possible. In the other much larger group the injuries were milder, the physical signs were deemed insufficient for a diagnosis of a perforating intestinal lesion, and conservative treatment was adopted; recovery under such treatment was the rule, but occasionally convalescence was complicated by an intraperitoneal abscess which required drainage. One of these less severe cases [illegible] of bleeding into the alimentary tract, as shown by hæmatemesis and melæna, that such intramural intestinal hæmorrhages are the essential pathological changes in the milder forms of underwater blast injury. The development of abscesses in such cases [illegible] generally attributed to bacterial leakage through one [illegible] these hæmorrhagic areas in the bowel wall, but it is questionable whether they do not really indicate an initial error in diagnosis and result from undetected perforations; this is the interpretation adopted in compiling the following summary of the injuries in the recorded cases.

Our knowled [illegible] any points [illegible] tomy has b [illegible] erred to in t [illegible], and from a limited number of necropsies (Wakeley 1941, Breden, d'Abreu, and King 1942). Recently attempts have been made to remedy these defects by studying the lesions produced experimentally in animals by blast in water (Cameron, Short and Wakeley 1942, Williams 1942). A high, almost universal, incidence of lung injury, in the form of typical blast hæmorrhages, was noted in these animals. Abdominal injuries were somewhat less common; the part affected in these was the gastro-intestinal tract, which showed numerous subperitoneal and submucous hæmorrhages. In the experiments described in this preliminary report, actual perforation was found on only one occasion, and that in the stomach. The distribution and severity of the gastro-intestinal lesions seemed to depend to a considerable extent on the species of animal employed.

NATURE OF LESIONS AND TREATMENT IN RECORDED CASES OF UNDERWATER BLAST INJURY

Author	No. of cases	With abdominal injury		With chest injury
		Perforating	Non-perforating	
Mathew (1917)	10	0	10 All recovered	8
Atkins (1940)	3	2. Laparotomy and suture, both perforations in ileum recovered	1 Laparotomy, intestinal hæmorrhages found died of bronchopneumonia	1
Breden, d'Abreu & King (1942)	10	3 Laparotomy and suture in 1, perforations in ileum died. Conservative treatment in 2, late operation required for suprapubic or pelvic abscess, recovered	7 All recovered	1†
Gordon Taylor (1942)	4	1 Treated conservatively, required late operation for retrocæcal abscess, recovered	3. All recovered	
Anonymous*	No. not stated	2 ? Site, both died of peritonitis, one after drainage operation	No. of cases not stated, all recovered	.
Kark (1942)*	1	1 Laparotomy and suture, perforation in ascending colon, recovered	0	1
Coyte (1942)*	1	1 ? Site late operation for diffuse peritonitis, recovered with fæcal fistula which closed	0	0
Barber (1942)*	2	2 Laparotomy and suture, both perforations in ileum, recovered	0	0
Total	Over 33	12 With 6 deaths	Over 21 with 1 death	11

* Quoted by Gordon Taylor (1942). † Confirmed by necropsy.

This paper is based on a clinical and pathological study of 17 underwater blast injuries in men between the ages of 19 and 45 years. They were derived from two naval episodes yielding 11 and 6 cases respectively. In both instances a small vessel of corvette or trawler class was sunk while carrying some of its depth charges primed and ready for ejection into the sea, and when these exploded a number of the crew who were in the water were injured. We possess full details of the first incident. Here the explosion was due to a charge detonating at depth after the order to abandon ship had been given. By this time 15 of the crew of 39 had managed to clamber on the ship's lifeboat and float, though both these craft were badly jolted and [illegible] afterwards [illegible] hurt. The [illegible] y immersed [illegible] occurred. All had on pneumatic lifebelts so that their heads and shoulders were out of the water. Most of them were wearing light clothes such as shorts or shirts, but a few were clad in full duty kit complete with duffle coat (thick fawn over-

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[1] [illegible] a brief summary of a [illegible] injuries, based on more [illegible] delivered by Surgeon [illegible] Lancet, 1943, i, 244)

University of Liverpool

On July 10 the honorary degree of master of surgery was conferred on Mr. Hugh Morriston-Davies.

At recent examinations the following were successful:

MB

A. B. Concanon, G. Sanderson, Mary D. H. Sheridan and V. K. Summers.

FINAL EXAMINATION FOR MB, CHB

Part III.—Mary A. R. Allan, Muriel C. Andrews, A. Ansell, E. R. Banner, Beryl R. Bentley, R. A. Blyth, N. Broughton, Hilda E. Bullen, W. G. Canning, G. Davies, I. H. Foy, Joan O. Grant, E. N. Hugh-Jones, Eirwen M. Jones, J. J. Lieben, I. P. Madhok, Margaret L. Magee, A. W. Merrick, Joan C. Miller, K. H. Oldfield, E. W. Parry, E. Scott, K. H. Slatter, Nora Taggart and G. A. Wetherell.

Part I.—M. K. Alexander, J. T. D. Allen, E. T. Anderton, H. B. Andrews, Beryl G. [illegible], K. W. F. Baruch, J. P. D. Bates, T. J. Boag [illegible] E. Cooper, D. Craddock, Constance M. Davi [illegible] umbell, E. D. Edmondson, J. L. Edmondson, [illegible] Ellam, P. Foster, I. J. C. Frew, B. R. Frisby, S. Gillis, N. J. Gourdji, D. A. Gregson, C. R. Helsby, Winifred L. Hollick, G. Hughes, L. Jacobs, D. O. R. Jones, E. S. Jones, H. A. Jones, J. T. W. Jones, P. R. B. Jones, R. S. Jones, M. Kirwan, W. T. W. Lawson, Joyce R. Lewis, S. Lipton, J. B. Lynch, K. McCarthy, M. G. McEntegart, R. H. Martlew, Lucille F. Morgan, D. B. Mossman, C. M. Ogilvie, C. A. Pearson, H. H. Pilling, J. B. Roberts, Isabel S. Smellie, G. W. Storey, P. J. Taylor, W. A. Thompson, Corris Venables, H. Wickham and J. R. E. Wilson.

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MD.—J. M. Crawford and E. L. Thomson (commended).

MB, ChB.—T. M. Abbas, T. L. Adamson, W. R. M. Alexander, R. P. Anderson, Catherine O. Bell, W. J. Bell, G. S. P. Birtwisle, J. A. P. Bouton, D. C. Boyd, Janet Braid, J. S. Brown, Scott Campbell, J. A. Caskey, Jessica B. Core, C. M. Cornforth, Bruce Cruickshank, I. M. Cuthill, J. A. Dick, R. W. Draper, G. R. H. Drew, T. B. M. Durie, J. C. Edgar, Rowland Elliot, Constance M. Evans, Ida M. K. Fenton, Mary G. Findlay, J. B. Gibson, G. T. Goodall, Jessie R. Gray, Sarah K. R. Gray, H. M. Guthrie, R. D. Guy, R. R. Hamilton, H. C. Hastings, Lorna H. Heslop, Miriam M. Heughan, Elizabeth M. Hislop, D. R. Hughes, David Hutchison, D. G. Illingworth, W. H. Isles, Isla M. S. Jamieson, J. C. Johnson, Kirsty M. Johnstone, A. H. D. Large, J. H. Lawson, Doreen S. Leith-Ross, Audrey B. Lornie, W. M. M. Lyon, Margaret MacDonald, H. A. M'Dougle, Margaret M. M'Intosh, A. M. macLachlainn, A. M. Macleod, A. T. Macqueen, D. J. L. MacWatt, J. G. Martin, T. S. Matheson, Manuel Mendick, R. C. Milne, Patricia E. Mitchell, R. A. H. Morison, J. A. Morton, Agnes P. Muir, W. D. Munro, William [illegible] och, G. H. Pearson, J. J. Pepper, Margaret G. [illegible] attrie, Monica M. Renner, Dorothy C. G. M. [illegible] G. I. Robertson, D. W. Robinson, James [illegible] I. H. Smith, J. G. Sommerville, R. J. C. [illegible] P. Splitt, Sheila M. Stark, Isabel F. Suther[illegible] B. Taylor, G. H. M. Thornton, A. R. Watson, R. W. Watson, Margaret Watt, Elizabeth G. Watts, T. B. Whiston, J. B. Wilson, L. A. Wilson, Olive Wilson and R. D. Young.

MB, ChB of the Polish School.—Krystyna Albrecht-Berezowska, K. P. Durkacz, J. K. Gaska, Stefan Harasymowicz, Karol Konopacki, Magdalena K. Munk, T. M. Ostrowski, Teodor Radula, Bronislaw Sedzimir, Henryk Seid, Janusz Srzednicki, Wanda H. Wojcik and Boleslaw Zietak.

BSc.—Margaret G. Proudfoot, MB.

DPH.—J. B. Brown, MB, and O. H. Siung, MB (in absentia).

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DPH.—B. R. Henry; Harold Kennedy; J. A. Magee; G. A. Mullan.

* In absentia.

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The George medal has been awarded to Captain C. Blacker, MC, RAMC.

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Proposal for adoption of a postal ballot on major issue policy and weekly or fortnightly bulletins to members dealing w these issues; the starting of a correspondence section in the Jour of the BIR; consideration of an inquiry by the BIR into present shortage of X-ray tubes; proposal that medical matte be considered and voted upon by medical members only; conside tion whether it is in the interests of radiologists that the medical secretary should be a serving officer in HM Forces.

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This association which has raised £10 million for hospitals celebrated its coming-of-age on July 15 by senting a cheque for £10,000 to the Duchess of Gloucester provide scholarships for the higher education of hosp nurses. The Minister of Health speaking at the birth party said that "in any comprehensive service we can do without that spirit of selfless hard work which has b up the association."

Appointments

CHRISTIE, A. F. MARY, MB LOND.: temp. part-time psychiatrist child guidance clinic, Southend-on-Sea.

HOLLOWAY, G. A. F., LMSSA: examining factory surgeon for Bour Lincs.

ROBERTS, W. MORRELL, MD MANC., MRCP: hon. consulting physic to the Reedyford Memorial Hospital, Nelson, Lancs.

Colonial Medical Service.—The following appointments announced:

BUCHANAN, J. C. R., MD EDIN, FRCPE; DDMS, Uganda;
GRENE, G. D., MRCS: MO, Gold Coast;
JACKSON, ESTHER, MB, MANC: MO, Aden;
LADKIN, R. G., BM OXFD: MO, Uganda; and
SODDY, J. R., MRCS: MO Gold Coast.

Births, Marriages and Deaths

BIRTHS

BINKS.—On July 8, in London, the wife of Flight-Lieuten .F. Allen Binks, RAFVR—a son.

COPELAND.—On July 22, the wife of Dr. F. J. Copeland, of Agas P.O., Hooghly District, Bengal, India—a son.

EVANS.—On July 15, in London, the wife of Dr. John Evans daughter.

KIDD.—On July 13, at Corbridge, Northumberland, the wife Surgeon Lieutenant J. D. Kidd, RNVR—a son.

MACFIE.—On July 8, at Ismailia, Egypt, the wife of Major Gordon-Macfie, RAMC—a daughter.

MUSSEN.—In Washington, DC, the wife of Surgeon Com R. W. Musson, RN—a son.

NEEDHAM.—On July 7, the wife of Captain F. J. Allport Needha RAMC (missing at sea)—a son.

MARRIAGES

BYRNE—MEAGHER.—On July 3, at Haslemere, Patrick Byrne, MB, surgeon lieut.-commander, RNVR, to Mary Winif Meagher, MB.

HEARN—COOPER.—On July 14, at Padstow, George William He MD, major, RAMC, to Ann Cooper.

MCAFEE—WALL.—On July 7, at West Kirby, Lewis Alex McAfee, surgeon lieutenant, RNVR, to Joan Vallance Wall.

SLACK—CROMBIE.—On July 15, at Chester, Cyril Charles MB, to Margaret Melville Crombie.

DEATHS

BYRNE.—On July 10, in Cairo, Austin William Byrne, CBE, LPOOL, MRCP, DPH.

DUNCAN.—On July 12, at Higher Brixham, S. Devon, Louis Duncan, MB ABERD.

LANE.—On July 18, in London, Alfred Vavasour Lane, LR lieut.-colonel RAMC, retd.

MITCHELL.—On July 2, in Liverpool, Harold Alexander Mitc MD TORONTO, MCPS ONTARIO, aged 52.

PILCHER.—On July 17, at Boston, Lincolnshire, Cecil West Pilcher, MBE, MRCS, aged 72.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.

INJURIES PRODUCED BY BLAST IN WATER

J. C. GOLIGHER, MB EDIN, FRCS
MAJOR RAMC; SURGICAL SPECIALIST

D. P. KING
MD CAMB
MAJOR RAMC; PATHOLOGIST

H. T. SIMMONS
MD, CH M MANCH, FRCS
LIEUT.-COLONEL RAMC; OFFICER IN CHARGE OF A SURGICAL DIVISION

THE term "blast in water" or "underwater blast" refers to the sudden wave of positive pressure that is *propagated through the sea by exploding depth charges,* mines and bombs. This naturally constitutes a serious danger to shipwrecked sailors who happen to be in the water near such explosions. There are two main ways in which men may be exposed to this hazard. First, an [illegible] ne or [illegible] the [illegible] uisite [illegible] near [illegible] ndly, [illegible] the [illegible] jured [illegible] other [illegible] d by [illegible] boat. [illegible] would [illegible] men [illegible] blast njuries ought to be common. A search of the published vork however shows that, since the first of these injuries vas reported in 1917, not more than 40 have been ecorded.[1] This figure is agreeably surprising, but it is lmost certainly an underestimate, for many cases pro- *ably die in the water and never reach hospital,* while thers are only slightly hurt and recover rapidly and pontaneously without arousing much medical interest.

In the published cases the following were the salient eatures. The part chiefly affected was not the chest, as n bomb blast cases, but the abdomen; only a proportion f the published cases have shown signs of a chest lesion, ut all were suffering from an abdominal injury. The esions in the lungs exhibited exactly the same clinical eatures as those produced by blast from aerial bombs. o far as the abdominal injuries were concerned the cases ould be divided into two groups. In one the injury vas severe and an actual traumatic rupture of the small r large intestine was present, with appropriate local igns and well-marked shock. Treatment was by laparo- omy and suture where possible. In the other much arger group the injuries were milder, the physical signs vere deemed insufficient for a diagnosis of a perforating ntestinal lesion, and conservative treatment was dopted; recovery under such treatment was the rule, ut occasionally convalescence was complicated by an ntraperitoneal abscess which required drainage. One [illegible] ract, as shown by hæmatemesis and melæna, that such ntramural intestinal hæmorrhages are the essential athological changes in the milder forms of underwater last injury. The development of abscesses in such cases generally attributed to bacterial leakage through one these hæmorrhagic areas in the bowel wall, but it is estionable whether they do not really indicate an itial error in diagnosis and result from undetected rforations; this is the interpretation adopted in mpiling the following summary of the injuries in the corded cases.

Our knowledge of these injuries still lacks precision on ny points. Thus our information about their morbid atomy has been derived from the few laparotomies erred to in the table, and from a limited number of cropsies (Wakeley 1941, Breden, d'Abreu, and King 42). Recently attempts have been made to remedy *these defects by studying the lesions produced* experimentally in animals by blast in water (Cameron, Short and Wakeley 1942, Williams 1942). A high, almost universal, incidence of lung injury, in the form of typical blast hæmorrhages, was noted in these animals. Abdominal injuries were somewhat less common; the part affected in these was the gastro-intestinal tract, which showed [illegible] rhages. [illegible] report, [illegible] sion, and that in the stomach. The distribution and severity of the gastro-intestinal lesions seemed to depend to a considerable extent on the species of animal employed.

NATURE OF LESIONS AND TREATMENT IN RECORDED CASES OF UNDERWATER BLAST INJURY

Author	No. of cases	With abdominal injury		With chest injury
		Perforating	Non-perforating	
Mathow (1917)	10	0	10. All recovered	8
Atkins (1940)	3	2. Laparotomy and suture; both perforations in ileum: recovered	1. Laparotomy; intestinal hæmorrhages found; died of bronchopneumonia	1
Breden, d'Abreu & King (1942)	10	3. Laparotomy and suture in 1; perforations in ileum; died. Conservative treatment in 2; late operation required *for* suprapubic or pelvic abscess; recovered	7. All recovered	1†
Gordon-Taylor (1942)	4	1. Treated conservatively; required late operation for retrocæcal abscess; recovered	3. All recovered	..
Anonymous *	No. not stated	2. ? Site; both died of peritonitis, one after drainage operation	No. of cases not stated; all recovered	..
Kark (1942)*	1	1. Laparotomy and suture; perforation in ascending colon; recovered	0	1
Coyte (1942)*	1	1. ? Site; late operation for diffuse peritonitis; recovered with fæcal fistula which closed	0	0
Barber (1942) *	2	2. Laparotomy and suture; both perforations in ileum; recovered	0	0
Total ..	Over 33	12. With 6 deaths	Over 21 with 1 death	11

* Quoted by Gordon-Taylor (1942). † Confirmed by necropsy.

This paper is based on a clinical and pathological study of 17 underwater blast injuries in men between the ages [illegible] a number of the crew who were in the water were injured. *We possess full details of the first incident. Here the* explosion was due to a charge detonating at depth after the order to abandon ship had been given. By this time 15 of the cr[illegible] the ship's lifeboa[illegible] were badly jolted [illegible] sprang a leak, the men on them were unhurt. The remaining 4 officers and 20 ratings were actually immersed in the water when the explosion occurred. All had on pneumatic lifebelts so that their heads and shoulders were out of the water. Most of them were wearing light clothes such as shorts or shirts, but a few were clad in *full duty kit complete with duffle coat (thick fawn over-*

Since this paper was written we have read a brief summary of a John Burns lecture on underwater blast injuries, based on more than 80 cases seen in the present war, delivered by Surgeon Rear-Admiral Wakeley in Glasgow (*Lancet*, 1943, i, 244).

University of Liverpool

On July 10 the honorary degree of master of surgery was conferred on Mr. Hugh Morriston-Davies.

At recent examinations the following were successful:

MB

A. B. Concanon, G. Sanderson, Mary D. H. Sheridan and V. K. Summers.

FINAL EXAMINATION FOR MB, CHB

Part III.—Mary A. R. Allan, Muriel O. Andrews, A. Ansell, E. R. Banner, Beryl R. Bentley, R. A. Blyth, N. Broughton, Hilda E. Bullen, W. G. Canning, G. Davies, I. H. Foy, Joan O. Grant, E. N. Hugh-Jones, Eirwen M. Jones, J. J. Lieben, I. P. Madhok, Margaret L. Magee, A. W. Merrick, Joan O. Miller, K. H. Oldfield, E. W. Parry, E. Scott, K. H. Slatter, Nora Taggart and G. A. Wetherell.

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ROBERTS, W. MORRELL, MD MANC., MRCP: hon. consulting physic to the Reedyford Memorial Hospital, Nelson, Lancs.

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GRENE, G. D., MRCS: MO, Gold Coast;
JACKSON, ESTHER, MB, MANC: MO, Aden;
LADKIN, R. G., BM OXFD: MO, Uganda; and
SODDY, J. R., MRCS: MO Gold Coast.

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MUSSEN.—In Washington, DC, the wife of Surgeon Commander R. W. Musson, RN—a son.

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INJURIES PRODUCED BY BLAST IN WATER

J. C. GOLIGHER, MB EDIN, FRCS
MAJOR RAMC; SURGICAL SPECIALIST

D. P. KING
MD CAMB
MAJOR RAMC; PATHOLOGIST

H. T. SIMMONS
MD, CH M MANCH, FRCS
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THE term "blast in water" or "underwater blast" refers to the sudden wave of positive pressure that is propagated through the sea by exploding depth charges, mines and bombs. This naturally constitutes a serious danger to shipwrecked sailors who happen to be in the water near such explosions. There are two main ways in which *men may be exposed to this hazard. First*, an escort vessel or warship may be sunk while it has one or more of its depth charges primed, in which case the charges will explode when the ship sinks to the requisite depth, and any of the crew who are in the water and near enough will be subjected to the resulting blast. Secondly,

work however shows that, since the first of these injuries was reported in 1917, not more than 40 have been recorded.[1] This figure is agreeably surprising, but it is almost certainly an underestimate, for many cases probably die in the water and never reach hospital, while others an [illegible] recover rapidly and spontaneo [illegible] uch medical interest. In the [illegible] wing were the salient features. [illegible] was not the chest, as in bomb blast cases, but the abdomen; only a proportion of the published cases have shown signs of a chest lesion, but all were suffering from an abdominal injury. The lesions in the lungs exhibited exactly the same clinical features as those produced by blast from aerial bombs. So far as the abdominal injuries were concerned the cases could be divided into two groups. In one the injury was severe and an actual traumatic rupture of the small or large intestine was present, with appropriate local signs and well-marked shock. Treatment was by laparotomy and suture where possible. In the other much larger group the injuries were milder, the physical signs were deemed insufficient for a diagnosis of a perforating intestinal lesion, and conservative treatment was adopted; recovery under such treatment was the rule, but occasionally convalescence was complicated by an

tramural intestinal hæmorrhages are the essential athological changes in the milder forms of underwater last injury. The development of abscesses in such cases generally attributed to bacterial leakage through one these hæmorrhagic areas in the bowel wall, but it is uestionable whether they do not really indicate an itial error in diagnosis and result from undetected rforations; this is the interpretation adopted in mpiling the following summary of the injuries in the corded cases.

Our knowledge of these injuries still lacks precision on ny points. Thus our information about their morbid atomy has been derived from the few laparotomies erred to in the table, and from a limited number of cropsies (Wakeley 1941, Breden, d'Abreu, and King 42). Recently attempts have been made to remedy these defects by studying the lesions produced experimentally in animals by blast in water (Cameron, Short and Wakeley 1942, Williams 1942). A high, almost universal, incidence of lung injury, in the form of typical blast hæmorrhages, was noted in these animals. Abdominal injuries wer [illegible]; the part affected in these [illegible] tract, which showed numerous [illegible] ous hæmorrhages. In the experiments described in this preliminary report, [illegible] found on *only* one occasion, an [illegible] The distribution and severity [illegible] lesions seemed to depend to a considerable extent on the species of animal employed.

NATURE OF LESIONS AND TREATMENT IN RECORDED CASES OF UNDERWATER BLAST INJURY

Author	No. of cases	With abdominal injury		With chest injury
		Perforating	Non-perforating	
Mathew (1917)	10	0	10. All recovered	8
Atkins (1940)	3	2. Laparotomy and suture; both perforations in ileum; recovered	1. Laparotomy; intestinal hæmorrhages found; died of bronchopneumonia	1
Breden, d'Abreu & King (1943)	10	3. Laparotomy and suture in 1; perforations in ileum; died. Conservative treatment in 2; late operation required for suprapubic or pelvic abscess; recovered	7. All recovered	1†
Gordon-Taylor (1942)	4	1. Treated conservatively; required late operation for retrocæcal abscess; recovered	3. All recovered	..
Anonymous *	No. not stated	2. ? Site; both died of peritonitis, one after drainage operation	No. of cases not stated; all recovered	..
Kark (1942)*	1	1. Laparotomy and suture; perforation in ascending colon; recovered	0	1
Coyte (1942)*	1	1. ? Site; late operation for diffuse peritonitis; recovered with fæcal fistula which closed	0	0
Barber (1942) *	2	2. Laparotomy and suture; both perforations in ileum; recovered	0	0
Total ..	Over 33	12. With 6 deaths	Over 21 with 1 death	11

* Quoted by Gordon-Taylor (1942). † Confirmed by necropsy.

This paper is based on a clinical and pathological study of 17 underwater blast injuries in men between the ages of 19 and 45 years. They were derived from two naval

a number of the crew who were in the water were injured. We possess full details of the first incident. Here the explosion was due to a charge detonating at depth after the order to abandon ship had been given. By this time 15 of the crew of 39 had managed to clamber on the ship's lifeboat and float; though both these craft were badly jolted and the lifeboat immediately afterwards sprang a leak, the men on them were unhurt. The remaining 4 officers and 20 ratings were actually immersed in the water when the explosion occurred. All had on pneumatic lifebelts so that their heads and shoulders were out of the water. Most of them were wearing light clothes such as shorts or shirts, but a few were clad in full duty kit complete with duffle coat (thick fawn overcoat with hood). They were all swimming away from the explosion and thus had their feet and backs to it. Five died in the water and were presumably killed outright; their bodies were not recovered. The other 19 were brought to hospital 1½–2 hours after the mishap; 11 were found to show signs of injury while 8 were apparently unhurt. Most of these men were within 20 yards of the explosion; only 2, who both escaped injury, were farther away, at 30 and 60 yards. We have no accurate knowledge of the second incident. Among the casualties received from it were 6 with injuries due to underwater blast. Most of them were about 100 yards from the ship when the explosion, due to several depth charges, took place.

CLINICAL FEATURES

The clinical picture in all the cases was dominated by the symptoms and signs referable to the abdominal injury. Of these abdominal pain was easily the most prominent, and its intensity was a fair measure of the gravity of the injury. Its onset was sudden, coinciding with the explosion. The descriptions of it varied considerably. The majority likened it to the pain that attends a kick on the abdomen; some called it a cutting or gripping pain, or "like an electric shock," and a few described it as a sudden feeling of intense numbness involving the abdomen and lower limbs, which seemed to be rendered temporarily useless; 2 patients complained also of pain in the testicles. In the milder cases the pain lasted only a few minutes and enforced only a momentary cessation of swimming. In 7 of the more serious cases however the patient was completely crippled for a time and just floated listlessly in the water; but eventually in these also the pain abated so that by the time they were rescued (20–45 minutes after the explosion) all but 2 were swimming again, and were able to help themselves out of the water. At first most of them could stand and walk on the deck of the rescuing motor launch; but this was not for long. Their emergence from the sea was soon followed by a return of their abdominal pain with greatly increased severity and this compelled them to sit or lie down. Whatever the original form of the pain, it was now sharp and cutting, and aggravated by movements of the abdominal wall. At this stage also certain other symptoms developed in some of the cases. Nausea followed by vomiting occurred in 9; the vomitus in 4 of these probably contained blood. An urgent desire to defæcate was experienced by 7, and was associated with urgency of micturition in 5. In only one case did the motion passed in response to these calls contain blood; there was no hæmaturia. Respiratory symptoms were present in only 2 patients and were entirely overshadowed by those emanating from the concomitant abdominal injuries. One patient complained of pain and a feeling of tightness in the lower part of the chest; another had a small hæmoptysis on his way to hospital. So far as can be determined none of our cases were rendered unconscious by the blast, nor were there any symptoms indicative of injury to the auditory or visual apparatus.

The patients from the first incident, who all reached hospital soon afterwards, were suffering from the effects of cold and were shivering and cyanosed on admission. Many of the more seriously injured cases were profoundly shocked and 2 actually died within a few minutes of arrival. With warmth and morphine their colour and general condition improved but a tinge of cyanosis persisted in 3. The cases from the second incident had recovered completely from the chill of their immersion by the time they got to hospital. Only 2 were at all shocked; none showed cyanosis.

Abdomen.—This was examined in 16 cases, one patient having died before any detailed examination could be carried out.

(*a*) *Cases with intestinal perforation* (9).—In 7 patients, all severely shocked, there was diffuse tenderness and boardlike rigidity of the abdomen as with a perforated peptic ulcer. There was no loss of liver dullness in any of these cases, but peristaltic sounds were absent in all but one. No doubt existed about the diagnosis of a perforating injury of a hollow viscus. While the patients were undergoing anti-shock treatment before operation they were re-examined several times over a period of 5–6 hours; despite morphine gr. ¼ there no appreciable alteration in their abdominal condition. 2 patients, the physical signs were less pronounced. Tenderness and rigidity were present only in the lower abdomen; elsewhere the abdominal wall moved fairly well with respiration. But there was a faint catch in the respiratory excursion and the breathing was slightly "grunting" in type. Liver dullness was reduced by 2½–3 in. in the nipple line. Normal peristalsis was heard on auscultation. Both cases were moderately shocked and had a pulse-rate of 100–110 per min., and this together with the abdominal signs pointed to a serious intraperitoneal injury. At operation lower ileal perforations were discovered in both patients.

(*b*) *Cases without intestinal perforations* (8).—The abdominal signs in these cases were less definite and usually less widespread than in the patients with perforating lesions. They consisted of a variable amount of tenderness and "guarding," usually in the lower abdomen and often localised rather sharply to one or other iliac fossa. The rest of the abdomen was quite soft and painless on palpation, and the abdominal wall moved well with respiration. There was no loss of liver dullness. On auscultation peristalsis was normal except in one case in which on initial examination the abdomen was completely silent. One patient had diffuse abdominal tenderness and guarding, but the latter did not amount to boardlike rigidity, and after 5 hours treatment with heat and morphine his signs were restricted to the subumbilical region as in the other cases. This patient, who had a severe degree of blast injury to one lung, was the only one of the cases without perforation who had an appreciably raised pulse-rate. The influence of conservative treatment and especially of morphine in causing rapid amelioration in the symptoms and signs of patients with non-perforating injuries was noticeable. In only 2 cases did these measures fail to produce some improvement in 6–8 hours; their condition was considered to be sufficiently suggestive of a perforation to call for laparotomy. In one of these, whose tenderness and rigidity had been in the right iliac region and extending up towards the loin, a large hæmatoma was found in the wall of the cæcum together with a small retroperitoneal hæmorrhage behind the right colic flexure. In the other, whose signs had centred more on the left iliac fossa, a smaller solitary hæmorrhage into the wall of the pelvic colon was found.

Chest.—The chest was examined in 15 cases, 2 having died before this could be done. Five patients showed signs of blast injury to one or both lungs—impairment of the percussion note and numerous râles at the pulmonary bases. Hæmoptysis developed in only one case. Taken in conjunction with the history these abnormalities were regarded as satisfactory evidence of blast damage to the lungs. It was impracticable to obtain radiological confirmation of these diagnoses, bu they were substantiated at necropsy in the cases that died. The 2 cases that died shortly after admission, before the chests could be examined clinically, were also found to hav blast injuries to their lungs at autopsy. Thus taking clinic and pathological material together 5 of the 9 cases wi intestinal perforations and 2 of the 8 cases with no perforating abdominal lesions had concomitant injuries the lungs.

Other regions.—None of the cases had any superficial bru ing, or bone or joint injuries. No abnormalities were d tected in the nervous system, ears or eyes.

DIAGNOSIS

The most important consideration in diagnosis was decision whether a perforating abdominal injury present or not. As a rule this was not difficult to d Agonising abdominal pain was naturally suggestive of perforation, but the final diagnosis of such a depended on the presence of persistent severe abd tenderness and rigidity, together with a raised pulse- and others signs of shock. In non-perforating in the findings on abdominal palpation were less de and extensive, and, unlike those in cases with p tion, showed rapid improvement during a short period observation, especially if morphine had been stered, as was generally necessary in the treatment their shock. The pulse-rate in these cases was not unless they had severe associated lung injuries. tion of liver dullness and absence of peristaltic sound much reputed as aids to the diagnosis of were too inconstant and unreliable to be any real Though elicited often enough in the more typical where they were of no particular diagnostic value, were absent in the more doubtful ones, in whic evidence of perforation would have been of assistance.

TREATMENT AND PROGRESS

The treatment of these cases did not differ fundamentally from that of any other non-penetrating abdominal injuries. Laparotomy was performed, as soon as the general condition permitted, in all cases suspected to have visceral ruptures ; conservative treatment was reserved for those in which we felt certain that there was no perforation. But the associated pulmonary lesions also called for attention and imposed certain difficulties on the treatment of the abdominal condition, particularly in [illegible] In only one [illegible] omplete bar to [illegible] increased the [illegible] r cases and was an important factor contributing to the high mortality.

Most of the patients who required operation were considerably shocked on admission and needed resuscitation before surgery could be employed with reasonable safety. For fear of overloading the venous circulation by plasma or blood infusions, and thereby increasing alveolar bleeding and aggravating the chest lesions frequently present in these cases, such infusions were as far as possible avoided and reliance placed on heat and morphine in combating shock. Exceptions had to be made in 2 very ill patients, in whom the immediate danger of withholding intravenous fluids seemed to outweigh any more remote risks attending their administration ; an infusion of several pints of plasma was given to each with well-marked improvement.

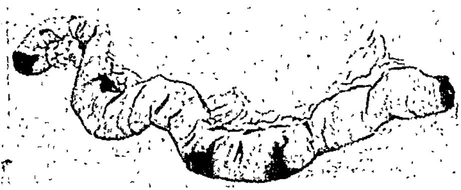

Fig. 1—Autopsy specimen of ileum, showing multiple subperitoneal hæmorrhages

The choice of anæsthetic for these patients was a problem. The damage to the lungs made ether undesirable either in pure form or in combination with nitrous oxide and oxygen or intravenous barbiturates. On the other hand, the shocked condition of most of the patients increased the risks of chloroform or spinal anæsthesia, and local infiltration of the abdominal wall followed by splanchnic anæsthesia seemed unlikely to be adequate for the task in hand. Cyclopropane would probably have been the ideal anæsthetic in these cases, for it is given with a high percentage of oxygen, requires little reinforcement with ether to secure good muscular relaxation, and has little depressant effect. Unfortunately it was not available to us. We finally chose "open" ether [illegible] complications and spinal [illegible] th satisfactory results.

[illegible] an exploratory laparotomy, [illegible] inal right [illegible], and the [illegible] injuries. erforations were closed as they were found ; hæmor- ages required no treatment. In only one case, with ultiple closely set perforations in one of the lower ileal ops, had resection to be considered ; fortunately it was ssible to overstitch perforations satisfactorily. The her organs were then briefly examined, and the domen closed in layers, provision being made for ainage of the rectus sheath but not the peritoneum. stoperative care followed customary lines, but special ention was given to the chest condition. Oxygen s administered with a BLB mask to all cases showing anosis, and, though found irksome by the patients, tainly improved their colour. Prophylactic sulpharidine therapy was not employed.

Of the 9 cases with perforations, one died of shock rtly after admission ; another, with severe blast ries to the lungs and in poor general condition, ught unfit for operation and treated conservatively, l mainly as a result of his chest lesions ; and 7 were submitted to laparotomy. Of these latter, 4 died (2 of shock, 1 of pneumonia and 1 of peritonitis) ; the remaining 3 had a variable amount of trouble with postoperative bronchitis and wound sepsis, but made good eventual recoveries.

Of the 8 non-perforating cases, one died of shock immediately after admission, 2 were subjected to operation and recovered satisfactorily, and 5 were treated expectantly. These latter all did well ; their pain, tenderness and rigidity rapidly subsided, and as a rule within 18–72 hours they were completely free from symptoms and signs. During these first two or three days a reactionary pyrexia of 100°–102° F occurred in most of them. We do not think this was due in any way to their blast injuries and attribute it rather to their long immersion in water, for we have observed a similar pyrexial reaction in many other patients who have been immersed in the sea for a long time. The patient in whom blood was observed in the motions had been tender in the left iliac region, and was subsequently sigmoidoscoped ; no abnormality was observed to 26 cm. Most of these patients were discharged from hospital within 7–10 days.

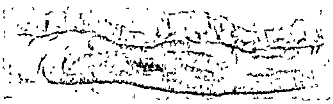

Fig. 2—Ileocæcal region at operation, showing large cæcal hæmorrhage.

PATHOLOGY

This account of the pathology of the injuries is based on the findings of 9 laparotomies and 7 necropsies carried out on 12 patients.

Abdomen.—The morbid changes observed were confined mainly to the alimentary tract itself and were of two sorts—intramural hæmorrhages and perforations.

The hæmorrhages, which occurred in both subperitoneal and submucous layers, were usually multiple and widespread, and though they involved chiefly the small intestine they were also found in the large gut, stomach, and even the lower part of the œsophagus. Two cases however had single hæmorrhages in the large intestine alone. The lesions were rounded or irregular in shape. Their size varied—in the small intestine they had an average diameter of about ¾ in. (see fig. 1) ; in the large intestine they were mostly bigger, and one case had an enormous hæmorrhage in the anterior wall of the cæcum and lower part of the ascending colon (fig. 3). In the stomach the hæmorrhages were mainly submucosal, and were found in the region of the lesser curvature, cardia and fundus ; in one case the mucosa overlying the hæmatomas on the lesser curvature had broken down, giving rise to numerous small erosions. The lesions at the lower end of the œsophagus closely resembled thrombosed external piles. In association with these gastro-intestinal hæmorrhages the lumen of the gut often contained a considerable quantity of altered blood.

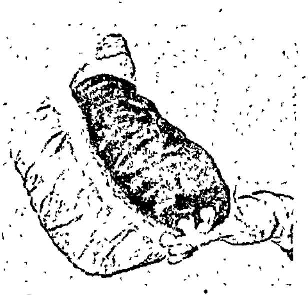

Fig. 3—Autopsy specimen of ileum containing a perforation.

The perforations occurred in all parts of the jejunum and ileum but not in the stomach or large bowel. They were roughly circular, and varied in diameter from ½ to 1¼ in., and in number from 1 to 20 in any particular case. No part of the small intestine seemed specially liable to perforation, and [illegible]

Fig. 2 depicts one of the perforations.

At laparotomy these two types of lesion were never found together in any one case ; thus 2 cases had hæmorrhages alone and 7 perforations without hæmorrhage. At necropsy, on the other hand, the two were commonly associated ; and this held also for those perforating cases that had previously been subjected to laparotomy and in which no evidence of intestinal hæmorrhage had been discovered by the surgeon. Some of the perforations indeed were seen at autopsy to be ringed by a zone of hæmorrhage and bruising. It is a little difficult to reconcile these discrepancies in the operative and necropsy findings. The hæmorrhages which were present at autopsy but not at operation, and particularly those around sutured perforations, may sometimes have been due to operative trauma. Alternatively they may have been the result of slowly progressive bleeding from small capillary tears, which had taken some time to produce visible hæmatomas. A similar sort of delayed hæmorrhage from the alveolar capillaries is recognised in connexion with blast injuries of the lungs (Williams 1942).

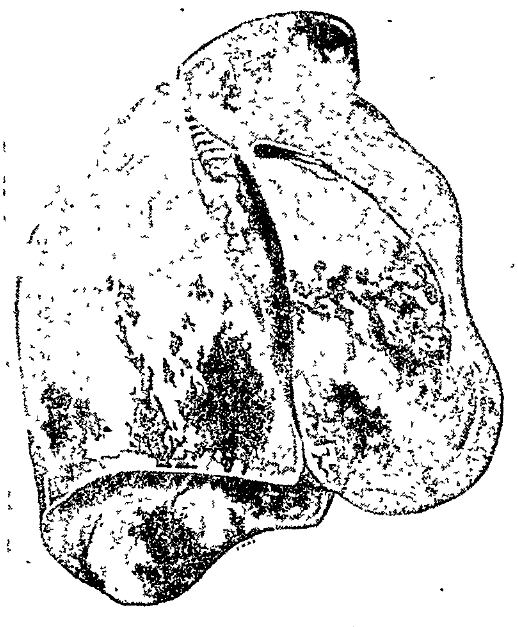

Fig. 4—Lung, showing subpleural hæmorrhages.

No injuries were observed in the other hollow viscera, such as the urinary bladder or biliary passages, nor in the solid organs, with the exception of one case in which there was a diffuse hæmorrhage into the splenic pulp, without tear of the capsule.

A retroperitoneal hæmorrhage into the loose areolar tissue behind the right colic flexure was a remarkably frequent finding at both laparotomy and necropsy, being present in 10 of the 12 patients. The colon wall itself was undamaged in all these cases. Hæmorrhage in this region due to underwater blast has also been described by Breden, d'Abreu and King (1942).

These evidences of injury were modified in several of the necropsies by changes due to peritonitis ; but in only one late case with multiple intraperitoneal abscesses did the abdominal condition appear to be the immediate cause of death.

Thorax.—Of the 7 cases coming to necropsy, 6 showed evidence of damage to the lungs. The lesions consisted of multiple hæmorrhages into the lung substance and beneath the visceral pleura, the lower lobes being those most affected. These hæmorrhages were macroscopically and microscopically identical with those found in bomb blast casualties and will not be further described. They are illustrated in fig. 4. No other significant abnormalities were observed in the thorax.

Cranium.—In only one autopsy was the cranial cavity opened ; no abnormality was observed in the meninges or brain.

The spinal cord and meninges were not examined in any of the cases. A routine search at necropsy for hæmatomas in the muscles of the abdominal and thoracic wall disclosed a few small hæmorrhages in the pectoralis major in one case but was otherwise unsuccessful.

DISCUSSION

The effects of blast in water resemble those of blast in air, in so far as the skeletal and muscular structure of the limbs and trunk are unaffected and lesions are restricted to the contents of the compressible abdominal and thoracic cavities, but differ from them in the much greater frequency of abdominal than thoracic injuries. Experience with bomb blast suggested that the lungs were the organs most vulnerable to this form of violence and that the abdominal viscera were relatively immune. It is interesting to consider why this ratio of susceptibility should be reversed with underwater blast. The explanation may lie partly in the manner of immersion of these cases in the water. Usually the shoulders and upper part of the chest are supported above the surface by a lifebelt so that the chest cavity is only partially exposed to the blast while the abdomen is completely so. Indeed, it may be that most of the force applied to the thorax is transmitted not directly to the chest wall but indirectly through the abdominal viscera to the diaphragm. This mechanism would accord well with the fact, observed in our cases at least, that chest lesions are found almost exclusively in the patients with severe abdominal injuries, in whom the violence applied to the abdomen would be more likely to overflow to the chest cavity. In the experiments of Cameron, Short and Wakeley (1942), and of Williams (1942), the animals exposed to blast in water were supported by means of floats attached around the neck so that the entire thorax was submerged, and lung injuries were more common in them than in human cases.

Another factor predisposing the abdomen to injury by blast in water is the purely muscular structure of the greater part of its parietes. During immersion the tonicity of the muscles of the abdomen, like those of other parts, is lessened, and therefore the protection afforded to the contained viscera is diminished. The musculatu of the thoracic wall is also relaxed under such conditions but the support provided by the bony and cartilaginou framework of the thorax remains unchanged.

Williams (1942) has shown that blast in water consis purely of a wave of positive pressure and has no negati or suction component. How this wave produces t lesions associated with blast injury is, in the present sta of our knowledge, a matter for speculation. When reaches the body the compressible abdomen and thora presumably undergo a sudden severe compressio and the tension within them is momentarily great increased. But it is difficult to understand why a diffu pressure change of this sort should affect some and not a the contained viscera, and why in particular the sol abdominal organs should usually escape injury. For t most part it is viscera containing air, such as the intestin stomach and lungs, which are injured. Williams sugges that, since the body has roughly the same density water, the blast wave impinging on its surface suffers reflexion but is transmitted through it as if it were much water. When it reaches organs containing air gas however the static energy of the wave is convert into kinetic energy with resulting disruption, this chan being comparable to that which occurs at the surface the water over an exploding depth charge causing a dom of spray. This theory is ingenious but not entir satisfying, for according to it one would expect the in the alimentary tract to be most severe in the co and stomach in which gas is abundant, whereas they oc in their grossest form usually in the small intestine, which gas is not normally so notable a content. Also leaves unexplained the frequent occurrence of rhage into the areolar tissue behind the right flexure and the occasional ruptures of solid vis (Wakeley 1941).

The anterior abdominal wall is the thinnest and resistant portion of the abdominal parietes and doubt under compression it is the part that yields most. So of the perforations in the small intestine might conc ably have been due to nipping of the bowel between anterior abdominal wall and the spine or pelvis ; and did not differ in appearance at operation from subparietal intestinal ruptures of civilian life, which sometimes due to this mechanism. But usually lesions in the small gut were more numerous than c reasonably be accounted for by such an event ; course, the colonic and gastric hæmorrhages could no explained in this way. In addition there was ne bruising of the anterior abdominal wall itself nor prevertebral retroperitoneal tissues such as migh expected occasionally to occur as a result of the in

Zuckerman (1940, 1941) has shown that the resulting from aerial blast are more marked in the on the side directed towards the explosion. If this also to blast in water it constitutes an a favour of turning the back rather than the front of the abdomen towards the course of the wave, because it is the stronger of the two walls and will probably provide more protection to the abdominal, and indirectly the thoracic, viscera. Of the two ways in which this could [illegible] tically with the front of the [illegible] in the probable site of the [illegible] the back—the second would obviously be preferable, because the anterior abdominal wall would then be practically at the surface of the water and might escape compression altogether. Unquestionably however the greatest hope of safety for the potential victim of blast in water lies in putting as great a distance as possible between him and the origin of the blast, and if, as would probably be the case with an indifferent swimmer, the supine position could only be maintained at the expense of his rate of progress away from the source of danger, it would be better abandoned in favour of the more usual prone position for swimming.

In our [illegible] pare the distances [illegible] he water from the [illegible] es. The maximum injurious range for man of a charge exploding at depth would appear from this investigation to be about 20 yards. But within that range there was no close correlation between the distance and the severity of the lesion, for some men as close as 5 yards [illegible] quite unhurt, while others at [illegible] riously injured. These irregu- [illegible] by a difference in the attitude assumed in the water, for all the men were swimming away from the sinking ship at the time and were in the same obliquely prone position. Similarly, variations in clothing were inadequate to account for them. We must assume that there are considerable differences in individual susceptibility to injury by blast in water.

SUMMARY

The pathology, causation, clinical features and treatment are analysed in 17 cases of injury from blast in water.

All cases were suffering from injury to the abdomen. The lesions found were confined almost exclusively to the intestine, stomach a[illegible] consisted of intramu[illegible] Perforations occurred [illegible] present in 9 cases. The only constant sign of injury outside the alimentary tract itself was a retroperitoneal hæmorrhage behind the right colic flexure. The solid abdominal organs almost invariably escaped injury. In addition, 7 cases had signs of injury to the lungs, and the pulmonary hæmorrhages which were found were in every way identical with those described in bomb-blast casualties.

In the differentiatio[illegible] ing abdominal lesions [illegible] were persistent severe [illegible] together with [illegible] on and auscultation [illegible] es were diagnosed or could not be excluded were submitted to laparotomy as soon as they could be made fit for it. Because of the associated lung injuries, infusions of plasma and blood were as far as possible avoided in resuscitation, but it was not always practicable to dispense with them entirely. On theoretical grounds, cyclopropane is advoc[illegible]

[illegible] oxygen was administered by the BLB mask to all cases showing cyanosis.

Of the 9 cases with intestinal perforations, 2 were too [illegible] to stand operation and died, and 7 were operated on, with 1 deaths. Of the 8 cases with non-perforating [illegible] ions, 6 were treated conservatively with one death [illegible] om shock immediately after admission), and 2, in [illegible] om the diagnosis was doubtful, were subjected to laparotomy, both recovering. The causes of death were shock, the lung condition, and, in one case only, peritonitis.

In the production of underwater blast injuries, the [illegible] urious range for man of a charge exploding at depth [illegible] probably about 20 yards, but there are apparently considerable individual variations in susceptibility. The natural and wisest course for a person threatened by blast in water will be to get as far as possible from the impending explosion; while doing so he should swim on his back, if this will not seriously delay him.

We wish to thank Colonel W. A. Jackman for permission to publish this paper, Corporal Charles Lloyd, RAMC, for the drawings, and Private A. Watson, RAMC, for clerical assistance.

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ANAEROBIC INFECTIONS OF WAR WOUNDS

IN THE MIDDLE EAST

J. D. MacLennan, MD ABERD

MAJOR RAMC

(*Concluded from p. 99*)

PROPHYLAXIS AND TREATMENT

There is no practicable method by which anaerobic organisms [illegible] wounds. [illegible] general su[illegible] report.

Anaerobic Cellulitis

[illegible] tr[illegible] to [illegible] it has never been the primary cause of death.

Prophylaxis is in every way so similar to that of gas gangrene that it will be simpler and more convenient to discuss the two together.

Treatment of this condition is primarily and essentially surgical. There are three requisites—relief of tensio[illegible] and th[illegible] these [illegible] plete [illegible] celluli[illegible] betwe[illegible] extent [illegible] unless there are other good grounds, areas in which gas has been detected should not of necessity be ruthlessly excised and slashed.

Drugs of the sulphonamide series have on the whole been widely employed, both locally and by mouth, but without any very noticeably beneficial effect. In view of the extremely purulent nature of many of these wounds it seems doubtful if such chemotherapeutic agents can have much value, but provided they are not administered in very large amounts they can, at any rate, do no harm. If *Str. pyogenes* is present, they should probably be given as a routine.

Anti-gas-gangrene serum has not been used extensively, and when it has been given the dosage has as a rule been quite inadequate even from a prophylactic point of view. It certainly does not seem to be required in treatment, either on theoretical grounds or on the basis of clinical experience.

Anaerobic Myositis

CLOSTRIDIAL MYOSITIS—GAS GANGRENE

In the Middle East the incidence of gas gangrene has been 0.32% of all wounded, the case-mortality 50%. During the last war, in 1917–18, in a much more heavily infected terrain, the incidence was 0.36%, the case-mortality 25%. Although it is probable that the diagnosis in this war has been rather more strict and that many cases previously labelled "local gas gangrene" and the like are now classified as anaerobic cellulitis, it must be evident that neither in prevention nor treatment has much advance been made in the last 25 years. Yet in this period the potency of antisera has at least been doubled, and the whole group of the sulphonamide drugs introduced.

Prophylaxis.—In prophylaxis, as in treatment, surgical measures are likely to remain the primary means of attack. Unfortunately information on this aspect of the problem is singularly inadequate, and my own technical knowledge equally so. I can venture only on a few generalisations.

On theoretical grounds gas gangrene (and anaerobic cellulitis for that matter) should be eminently preventable by surgical methods alone; yet such has certainly not proved to be the case (table XXI).

TABLE XXI—PROPHYLAXIS OF ANAEROBIC INFECTIONS: EFFECT OF SURGERY

Type of case	Prophylactic surgery	No surgery	Total
Gas gangrene ..	64	60	124
Anaerobic cellulitis	7	10	17
Total ..	71	70	141

It seems to be generally agreed that in the Middle East wound excision and debridement have been neither so extensive nor so radical as was the practice in France and Flanders in 1917–18, and it certainly seems to be a matter for inquiry as to whether a return in some degree to the technique of the last war might not be advisable, at any rate in certain types of case.

As regards the type of case that is to be looked upon as specially liable to develop gas gangrene, it would be merely platitudinous to recapitulate here the importance of tissue damage and vascular disturbances, of foreign bodies, tourniquets, and tight plasters. Their influence has been fully appreciated; what is not so well known is that the site of the wound may be of considerable significance. This is brought out in table XXII.

TABLE XXII—INCIDENCE OF GAS GANGRENE ACCORDING TO SITE

Cases	Head	Arm	Abdomen	Back	Buttock	Thigh and buttock	Thigh	Leg	Total
Recovered	0	19	0	1	8	0	12	29	69
Fatal	1	13	1	0	12	5	25	16	73
Total	1	32	1	1	20	5	37	45	142

It will be seen that out of 142 cases concerning whom we have adequate details, gas gangrene affected the lower limb in 107 (75%). The relationship of bony injury to the development of gas gangrene is as yet uncertain: of these 142 cases 58 had fractures of some sort, but the significance of this cannot be assessed until the total numbers of casualties with and without bony injury are available.

The less satisfactory prognosis of the more evil-smelling wounds has already been pointed out; what has not been mentioned is that it is just these foul wounds that tend to loculate; or, conversely, it is the deep irregular wounds that are especially likely to become grossly contaminated. The necessity for leaving this type of injury widely open has on the whole been fully appreciated, but the same care has not always been taken to secure the adequate drainage of all its ramifications. This is an extremely important point, and neglect of it has undoubtedly influenced the onset of gas gangrene, and notably of anaerobic cellulitis in a certain number of cases.

It is very difficult to assess the value of drugs of the sulphonamide series in the prevention of anaerobic infections. Sulphonamide, sulphanilamide, sulphapyridine, sulphathiazole, sulphadiazine and sulphaguanidine have all been used in adequate dosage either locally or by mouth in the early treatment of infected wounds, yet the incidence of gas gangrene is substantially the same as in the last war. But the data are so meagre, the number of variables so large that no final conclusion can or should be drawn.

Sufficiently detailed information is available concerning the treatment of 113 cases of gas gangrene: in 52 of these one or more of the sulphonamides was used prophylactically, but in 9 cases the dosage must be regarded as wholly inadequate. (The standard of adequacy has been either local treatment with the powdered drugs or some of the impregnated dressings prepared in the Middle East, or else oral administration of at least 6 grammes daily.) The findings in the 43 cases receiving adequate treatment are set out in table XXIII.

It should be added that there was no significant difference in efficacy of one compound over another. It cannot be said that these figures are in any way encouraging. There are, however, certain types of injury in which these drugs may well prove to be of great importance in prophylaxis.

From the surgical point of view, some of the most difficult wounds to clean and above all to maintain clean, are extensive injuries to the buttocks; for even if they can be excised adequately, they are reinfected by the passage of fæces. (In this respect it is instructive to point out that of the 20 cases of gas gangrene involving the buttock, *Cl. welchii* was found in 18—an incidence of 90%; its incidence in all other cases of gas gangrene in the Middle East is 51%.) In a very few of these buttock wounds colostomies have been undertaken, but this practice has not been satisfactory, and has been almo universally condemned. In such cases it might we be worth administering some of the more potent intestin antiseptics—notably succinyl-sulphathiazole which re duces the intestinal flora to negligible proportions. S far as I know, such prophylactic treatment has not ye been given clinical trial.

TABLE XXIII—USE OF PROPHYLACTIC SULPHONAMIDE

Case	Method of administration			
	Oral	Local	Oral and local	Total
Recovered ..	8	12	1	21
Fatal	4	16	2	22
Total ..	12	28	3	43

As regards the use of gas-gangrene serum in prophy laxis the evidence is equally unsatisfactory and equall inconclusive. It is true that of the 113 cases of g gangrene under review prophylactic antiserum had bee given in only 13; but this cannot be accepted as a indication of its efficacy, for it was used equally sparing in infected wounds that never developed the diseas Furthermore, 10 of the 13 cases had received amounts serum very much in excess of the suggested prophylact dose.

Serum and sulphonamide have rarely been combined in prophylaxis—only 6 out of 113 cases had received treatment. No conclusions can be drawn from however, for no figures are available of the extent which similar procedures were carried out in other class of wounded.

To sum up, there is as yet no definite evidence of value of specific antiserum or sulphonamides, ei alone or together, in the prevention of gas gangrene.

Treatment.—As yet none of the antisera or che therapeutic agents have proved potent enough supplant surgery as the primary method of tre ment gas gangrene. Nothing more need be said here of aspect of the problem, except to point out that in in which radical operations are out of the question to the general condition of the patient, considerable b fit may be gained by the mere relief of tension in affected area, especially if combined with certain of ancillary methods of treatment.

Of the secondary therapeutic measures employe cases of gas gangrene in the Middle East, two a outstanding interest: these are serotherapy and che therapy. Owing to their complementary action uses in treatment will be considered together. relevant data are summarised in table XXIV.

The significance of these findings is so obvious require no comment. Indeed, the value of serothe is even more striking than appears from the tab It will be observed that 21 cases receiving serum ment died. Of these no fewer than 8 recovered

TABLE XXIV—THERAPEUTIC MEASURES IN 113 CASES OF GAS GANGRENE

Treatment	Cases			
	Total cases	Died	Recovered	Recovery %
Serum only	8	2	6	75
Sulphonamide only	28	22	6	21
Serum sulphonamide	[illegible]	19	39	67
Nil	19	15	4	21

doses of
in oral
number
to sero

then gas-gangrene infection only to die from other causes. The relevant facts are as follows:—

	Cases
Secondary hæmorrhage	2
Pulmonary embolism	2
Endocarditis	1
Streptococcal septicæmia	1
Transfusion reaction	1
Bronchopneumonia	1

Furthermore, of the remaining 13 cases 3 were infections in which *Cl. histolyticum* was present—i.e., a toxigenic clostridium whose antitoxin is not included in the polyvalent antiserum. Another most interesting case was too ill to receive surgical treatment, although he had clinical *gas gangrene on admission to hospital* He was

re not available as the hospital in question was shortly afterwards captured by the enemy.

Finally, 6 cases were moribund on admission to hospital. This last group has been included only after the most careful consideration. *It* would obviously be xtremely inaccurate to classify as moribund every case hat died shortly after receiving treatment, but each of hese 6 cases has quite definitely been in extremis before being seen by a medical officer, and has died within six hours of admission to hospital, in 2 instances before any urgical intervention could be attempted.

To sum up, of the 21 cases 18 could not be fairly aid to have died owing to the effectiveness of the serum r serum-sulphonamide administered.

ABLE XXV—ANAEROBES IN 58 FATAL AND 55 RECOVERED CASES OF GAS GANGRENE

Organism	Fatal strains	Cases %	Recovered strains	Cases %
l welchii	36	62	29	52
l. œdematiens	25	43	20	36
septicum	12	20	8	14

It might be argued that the more or less complete ffectiveness of the sulphonamides alone was due to the ative rarity in the Middle East of *Cl. welchii*, the ganism against which these drugs are by far the most tive. That this factor has been negligible (if, indeed, operated at all) is shown by the tabulated figures of total isolations of *Cl welchii*, *Cl. œdematiens*, and *septicum* in the 113 cases in question (table XXV).

Dosage and Administration—Although 16,000 IU been accepted in table XXIV as a therapeutic dose of -gangrene antitoxin, the amounts employed have erally been much in excess of this—the average for 45 cases successfully treated being between 40,000 50,000 IU. It has been given intramuscularly and lly, but with the most consistently successful results avenously in a slow drip along with sulphonamides or od.

lthough all the commoner sulphonamides have been loyed with benefit, the compound used most extensively and with the best results has been sulphathiazole. This drug has usually been administered in very large doses, intravenously to begin with, later by mouth. It should be added that sulphathiazole has been the most favoured drug, probably quite as much because of its reported efficacy in experimental infections as for any outstanding clinical reasons.

By far the most beneficial effects have been obtained by the combined use of serum and sulphathiazole. In one hospital, in which out of the last 11 consecutive cases of gas gangrene there has been only one death, the routine procedure is as follows —

> At operation sulphanilamide powder is insufflated into the wound the patient is then returned to the ward and an intravenous-drip transfusion started of sulphathiazole and concentrated *antiserum (and blood or plasma if necessary)*, up to 50 g of the drug and 100 c cm of the serum being given over 18 hours, depending on the condition of the patient Sodium bicarbonate is always given with the sulphathiazole Further dosage of drugs is largely by mouth and is dictated by the reactions of the patient.

It is impossible to assess the value of other forms of treatment—penicillin, hydrogen peroxide, acridine derivatives. The number of cases is too small and all have received sulphonamide and serum in addition

The great value of serum-sulphonamide therapy has only gradually become apparent in the Middle East, but it is to be hoped that as a result of these experiences the fatality-rate of gas gangrene may be materially reduced.

STREPTOCOCCAL MYOSITIS

Prophylaxis—So little is known either of the origin or the mechanism of infection in this condition that little can be said of its prophylaxis, but as the anaerobic streptococci have never occurred alone but always in association either with *Strep. pyogenes* or more rarely with *Staph. pyogenes*, it seems not improbable that early and adequate treatment with one of the sulphonamide group of drugs might prove of benefit. This, however, is mere supposition. Several of the cases had in fact received prophylactic doses of sulphonamides, but these were rarely large enough to be of much value and had always been discontinued for some time prior to the onset of infection.

Treatment.—In cases where *Strep. pyogenes* is present, treatment is relatively simple. Of the 13 known cases, 9 have recovered with the minimum of surgery and large doses of sulphonamides both locally and by mouth. In 2 cases an incorrect diagnosis of gas gangrene was made, with, in consequence, much more radical treatment.

> In one of these amputation of the arm was carried out After a very stormy three days the patient gradually settled down and made an uninterrupted recovery This man was receiving large doses of sulphapyridine immediately before *and for ten days after operation The other case died within* 18 hours *of the amputation of his thigh from a fulminating* hæmolytic streptococcal septicæmia. This man had received no drugs of the sulphonamide group until after operation.

Both the remaining streptococcal cases died—one from a toxic hepatitis before the effect of the sulphonamides was very apparent. In the other a correct diagnosis was made, but the relaxation incisions through deep fascia and into muscle were not apparently deep enough, and a large and spreading focus of infection remained unsuspected in the extensor muscles of the thigh. Although the hæmolytic streptococcal condition cleared up completely, the patient eventually succumbed to an anaerobic streptococcal septicæmia. There can be not the slightest doubt that this originated from the muscles of the thigh.

The staphylococcal cases have been more difficult and less satisfactory to treat. There have been 5 of these and 2 of them have proved fatal—one from bronchopneu-

subsided.

It is noteworthy that zinc peroxide has never been used in the treatment of these cases: it might well prove to be of great value, either in the aqueous suspension recommended by Meleney or, preferably, zinc peroxide-sulphanilamide paste described by Hoffman.

Other Infections

Postoperative synergistic gangrene.—In the treatment of this condition there is nothing to add to the original papers of Meleney; that is, local application of zinc peroxide suspension combined with a course of sulphanilamide by mouth.

Fusospirochætal Infections.—No information is available on the treatment of such infections in the Middle East.

Tetanus.—This has been dealt with by Boyd and MacLennan (1942).

SUMMARY

About 20–30% of all war wounds sustained in the Middle East campaigns between June, 1940, and October, 1942, contained sporing anaerobes (clostridia). In most cases these rapidly disappeared from the tissues without producing any obvious lesion, but in about 5% they caused cellulitis of varying degrees.

Gas gangrene (clostridial myositis) complicated 164 wounds, representing 0·32% of all wounds and 1% of those contaminated by anaerobic organisms.

Cultures from 146 of the wounds with gas gangrene showed the following clostridia in order of frequency: *Cl. welchii*, *Cl. œdematiens*, *Cl. septicum*, *Cl. histolyticum*, *Cl. bifermentans*, and *Cl. fallax*.

The distinctive clinical features of *Cl. œdematiens* infection have been emphasised because the condition is often overlooked in its early stages.

Infection of muscle by strictly anaerobic streptococci in association with aerobic pyogenic cocci was discovered in 19 cases; this condition is important to recognise, since it calls for most conservative surgical treatment.

Although most of the fighting has been on desert soil, where clostridia are scanty, the incidence of gas gangrene is little less than it was in France in 1918, despite the prophylactic use of sulphonamides and, to a less extent, of antitoxin. The question arises whether wound excision and debridement as practised today are sufficiently extensive.

In treating gas gangrene excellent results followed the combined use of antiserum and sulphonamides in really adequate dosage along with proper general and surgical measures.

In conclusion, it is a pleasure to thank here the many medical officers, too numerous to mention by name, who helped in every way throughout this inquiry—with case notes, with cultures, and with the benefit of their greater experience.

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"... the end of the war must see the opening of a determined campaign to secure not smoke abatement, which implies a mere alleviation of the evil, but smoke abolition. Smoke abatement is, in fact, dead. In its place there is a movement for the complete ending of smoke and other forms of air pollution based upon the knowledge that it is now technically possible as well as socially desirable. A sign of this is the growing demand among its members that the National Smoke Abatement Society should delete 'abatement' from its title and employ instead the word 'prevention' or 'abolition.' ... I would suggest for your consideration that we might be getting nearer to the mark with just 'smokeless air'—for example, the West Riding of Yorkshire Regional Committee for Smokeless Air."—From an address given in Leeds on July 2 by Mr. ARNOLD MARSH, gen. sec. of the NSAS.

Dr. EDWARD A. STRECKER of Philadelphia, president of the American Psychiatric Association, has been named special consultant to the Secretary of War for the Air Forces of the United States Army. Dr. Strecker is also consultant in psychiatry to the Surgeon-General of the U.S. Navy.

PHYTIC ACID AND IRON ABSORPTION

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To be absorbed an element must presumably be in solution. It follows, therefore, that if the diet contains a radicle which will precipitate the element in the intestine, this will prevent its absorption. When oxalates (Fairbanks and Mitchell 1938, Kohman 1939, Logan 1940), phosphates and phytates (McCance and Widdowson 1942 a, b) have been added to diets they have been shown to depress the absorption of calcium, and, mutatis mutandis, calcium has been shown to depress the absorption of oxalates (Barrett 1942) and phosphates.

The *absorption of iron must also be affected by* the solubility of its salts, and in experiments which were staged to study the effect of brown bread on the absorption of calcium, Widdowson and McCance (1942) found some evidence that the phytic acid in brown bread might interfere with the absorption of iron. So little of the iron in a normal diet is, however, absorbed, that the measurement of this absorption by balance experiment presents considerable technical difficulties, and the observers preferred to regard their results as suggesti rather than conclusive. Nevertheless some peopl seem to have accepted them as proof that phytic aci interferes with the absorption of iron (Bicknell an Prescott 1942).

The experiments now to be described were undertak to obtain further information on this matter, and particularly to answer the following question: If sodiu phytate is incorporated into a diet, will it depress th absorption of iron present in that diet but not previousl combined with phytate? It was felt that if an affirmative answer was obtained, it might safely be assumed th iron taken as the phytate itself would be absorbed badl or not at all. Advantage was taken of the discovery tha if a person is given a large dose of a soluble iron salt ther is a rise in the concentration of iron in the serum (Bin Hanzal and Myers 1935). This rise appears to b proportional to, although it does not necessarily actual measure, the amount of iron being absorbed (Moor Arrowsmith et al. 1939). Moore and his colleagues h already shown that iron taken in the form of th sparingly soluble phosphate did not raise the level iron in the serum.

SUBJECTS AND METHODS

Four normal men and five normal women have taken pa in these experiments. The usual practice has been for each person to carry out four tests, two to measure the effect of sodium phytate on the absorption of ferrous iron, and two make a similar study of its effect on ferric iron. Two of subjects, however, were only used for a single pair of exp ments. Four of the subjects began with the pair of ments dealing with ferrous iron, and five began with iron. Two or three of each group took the meal wit phytate first, and the others the meal with phytate Some of the subjects carried out additional experiment which phosphates replaced the phytates, or blank experim in which no iron was administered. All the tests were in a similar way. After an over-night fast the subject c to the laboratory and a sample of blood was taken. Break consisted of bread, jam and ferrous or ferric sulphate. The amounts were reckoned on the basis of weight—namely, 1·8 g. bread, 1·1 g. jam and 8 mg. iron kg. The flour used for making the bread was of the extraction patent type and the loaves were raised $NaHCO_3$ and cream of tartar. The iron salt was mixed the jam and spread on the bread. Some of the subjects one cup of tea, others two cups. When it was incorporate sodium phytate into the diet, a solution of compound was prepared from commercial "phytin described by McCance and Widdowson (1942a), and solution was used in the preparation of the dough. T added in such quantity that there was approximately as much phytic acid phosphorus in the portion of bread ea would combine with all the iron taken at the same time. the effect of phosphate was being studied, disodium hy phosphate was added to the bread in similar proportion

Samples of blood were collected after 1½–2 hours, 4–5 hours and 7–8 hours The blood was taken from the antecubital vein through stainless steel needles, used only for this purpose, into 8–10 c cm centrifuge tubes The first few drops of blood were discarded, and duplicate samples were collected in separate tubes The blood was centrifuged and the serum separated at once All glassware was cleaned by heating in sulphuric bichromate mixture and rinsing several times in hot tap water and glass-distilled water

The iron in the serum was determined as follows 2 c cm serum was mixed with 1 c cm N HCl and left to stand for 15 minutes, 2 c cm 20% trichloracetic acid was then added to precipitate the proteins (Both the HCl and trichloracetic *acid were purified by redistillation and made up to the* required strength with glass distilled water) The preliminary treatment with HCl prevented a loss of iron with the protein precipitate (Moore Minnich and Welch 1939)

After thorough mixing and centrifuging for 10 minutes 2 5 c cm of the supernatant liquor was transferred to a glass m of a mg Fe richlor 5 c cm with glass distilled water and 1 drop of concentrated HNO_3 was added After heating for 30 minutes in a boiling water bath and cooling 2 5 c cm amyl alcohol was added to each tube, followed by 1 c cm of approximately 3N KCNS The erric thiocyanate was extracted into the amyl alcohol layer by gentle shaking, and the intensity of the colour developed *was compared with that of the standard in a photoelectric* olorimeter

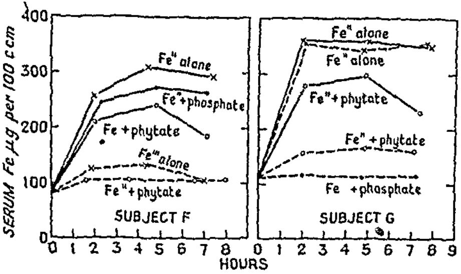
TABLE I—FASTING SERUM—IRON VALUES

Subject	Serum iron (µg per 100 c cm)							
A	135	110	80	99	116			
B	130	64	45	48				
C	123	90	137	90	106	100		
D	90	142	113	76	80	90		
E	178	148	142	130	190	102	94	133
F	65	65	87	96	96	109		
G	208	120	73	108	99	69	154	
H	115	122						
J	75	73						

RESULTS

Normal serum iron after an overnight fast—The amounts of iron which have been found in the serum of these The tests were day intervals, to 3 weeks in ability of the asting levels which have been found in some people The origin of these variations is not known, but it is evident from the order in which they occurred that they were not due to the administration of large doses of iron on previous occasions, nor to the removal of blood for the tests, for they rose and fell quite erratically The differences were not due to a variable blank, for a very low value for one subject was often obtained on the same day as a high value for another, and both estimations were carried out in the same batch

The level of serum iron before the first meal of the day evidently not nearly so constant in some subjects as the level of glucose or bicarbonate, or of the minerals Na, K, a, Mg or Cl It seems to have a wider range in a healthy person than most of the other components of the internal environment Some attempt has been made to find out e rate at which these spontaneous changes take place have made a full study of this would have been a large sk, but a cursory study of variations in serum iron roughout days on which no iron was administered ggested that the changes were relatively slow, for there is never much alteration of level over these 8 hour riods Moore, Minnich and Welch (1939) found a ange of 35 µg iron per 100 c cm serum in one bject during a 24 hour period, but usually the variations were much less than this They also studied the fasting levels of 16 young women at 4 weekly intervals for 6 months, the maximum difference in any one subject was 64 µg per 100 c cm They found that the changes were oscillating in type and had no persistent directional characteristics



Effect of phytates and phosphates on serum iron curves after a standard dose of iron—The variability of some peopl comp from rising avera subjects are shown in the figure and the maximum rises in the levels of serum iron of all the subjects in table II It will be clear at once from the table that on the whole, the ferrous was absorbed better than the ferric iron In some people (e g, subject F) the difference in favour of the ferrous salt was much greater than in others (e g, subject G), and subject A absorbed ferric better than ferrous iron This is in accordance with the observations of other workers (Heilmeyer and Plotner 1936 Moore, Arrowsmith et al 1939)

TABLE II—MAXIMUM RISE IN SERUM IRON

(µg per 100 c cm)

Subject	Fe alone	Fe + phytate	Fe + phosphate	Fe alone	Fe + phytate	Fe + phosphate
A	124	106		170	65	
B	172	54		80	sf	
C	125	62	98	89	49	
D	185	121		154	94	100
E	160	167		112	67	111
F	227	158	189	49	25	
G	250	75		246	56	6
H	35	12				
J				118	21	

sf = slight fall

The chief point of interest both in the figure and in table II is, however, that the incorporation of sodium phytate into the bread prevented the full rise in serum iron This was so whether the iron was given in the ferrous or ferric state, but sodium phytate had a more constant and on the whole a greater effect on ferric than on ferrous iron Subject E appeared to be able to absorb ferrous iron equally well whether phytate was present or not

Phosphate interfered with the absorption of ferrous iron in both subjects who were given it but its effect was not so great as that of phytate With ferric iron the results were more variable Phosphate did not appear to interfere with subject E s absorption of ferric iron at all In subject D phosphates and phytates had approximately equal effects, while in subject G phosphate interfered with iron absorption much more than an equivalent amount of phytate (see figure) This last result seemed so extraordinary that the serum iron curve with phosphate was repeated on this subject, with exactly the same results

Phytate and phosphate equilibria in vitro.—Some experiments have been carried out in vitro to study the nature of the compounds which were likely to have been precipitated in the alimentary tract during the course of these investigations. Solutions of ferrous ammonium sulphate, ferric ammonium sulphate, sodium phytate and disodium hydrogen phosphate were prepared, of such strengths that when either of the iron solutions was mixed with the phytate or phosphate the concentrations of the reactants were similar to those which would have obtained after the experimental breakfast and the two cups of tea. The pH of all mixtures was adjusted to 6·5 before separating the precipitates.

When ferrous or ferric ammonium sulphate was mixed with an excess of sodium phytate in this way, the amount of phosphorus in the precipitate was always greater than the chemical equivalent of the iron. The precipitate was white and was presumably a double phytate of sodium and iron.

When phosphate solution was used in place of the phytate, but the Fe/P ratio remained the same, the precipitates were coloured, and they contained less phosphorus than the chemical equivalent of the iron. They therefore probably consisted partly of the phosphate and partly of the hydroxide of ferrous or ferric iron. Hence, at the pH of the intestine, both ferrous and ferric phytates appear to be more insoluble than the corresponding phosphates or hydroxides. This conclusion is confirmed by the results of another experiment in which solutions of ferrous or ferric ammonium sulphate were added to a solution of sodium phytate and disodium hydrogen phosphate, so that the resulting mixture contained chemically equivalent amounts of phytate, phosphate and iron. The precipitate contained more phosphorus than the chemical equivalent of the iron, and 80–90% of the phosphorus was in the form of phytate.

DISCUSSION

It is evident from these results that appreciable quantities of iron must have been absorbed from the intestine after a large dose of a soluble iron salt. If the rise in serum iron is assumed to be proportional to the amount of iron absorbed, it is also clear that sodium phytate added to bread reduced the amount of iron absorbed. In these experiments conditions in the alimentary tract were artificial in that they did not resemble those of an ordinary meal, but if sodium phytate incorporated into bread has such an effect, it is fairly certain that the phytates in whole cereals would have a similar one, and would be capable of immobilising iron present in the rest of the diet. In all but one of the 16 experiments, however, there was a rise in the level of iron in the serum even when the iron salt was accompanied by sodium phytate. It is perhaps a little puzzling why any iron should have been absorbed at all if it entered the intestine in the form of the insoluble phytate (Moore, Arrowsmith et al. 1939). It may be that under the conditions of these experiments some of the iron escaped being precipitated by the phytate in the digestive tract. On the other hand, Fuhr and Steenbock (1943) and Nakamura and Mitchell (1943) have shown that ferric phytate can promote hæmoglobin formation in growing or anæmic rats, although not so efficiently as a soluble iron salt. There is a phytase in the intestine of the rat, and this may have been the explanation of these results but, in the light of Pringle and Moran's (1942) findings, one would not have expected a phytase to act with any freedom on an insoluble phytic acid salt.

SUMMARY

The amount of iron in the serum of 9 healthy adults has been estimated at weekly intervals for 4–8 weeks and has been found to vary considerably from time to time.

After the administration of large doses of soluble iron salts taken with a standard breakfast of white bread and jam, there was a rise in the level of iron in the serum, and generally speaking this was greater with ferrous than with ferric salts.

When sodium phytate was incorporated into the bread and taken at the same time as the iron salt, the full rise in serum iron was prevented. Hence, assuming that the rise in serum iron is proportional to the amount of iron absorbed, sodium phytate interfered with the absorption of iron. Disodium hydrogen phosphate had a similar but less regular effect.

Both ferrous and ferric phytate have been demonstrated to be less soluble than the corresponding phosphates at the pH of the intestine.

We are grateful to all the subjects for their cooperation. C. N. E. is indebted to the Medical Research Council for a personal grant and E. M. W. is in the whole-time service of the Council.

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SUPRAPUBIC CATHETERISATION
FOR PARALYSIS OF THE BLADDER IN SPINAL INJURY

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DESPITE the opportunities afforded by more than 3 years of total war there is still no agreement on the treatment of a bladder paralysed as a result of spina injury, and methods found wanting in the last war have been used again in this with equally unsatisfactory results. Intermittent catheterisation is still the most popular initial treatment and it is followed by urinary infection with almost unfailing regularity. Ascending infection is a common sequel and is either rapidly fata or leads to chronic invalidism from urinary sepsis and stone formation. The degree of infection is only exceeded by that produced by an indwelling urethra catheter, and although the addition of automatic tida drainage does much to prevent ascending infection the method has in this country proved disappointing in general and few cases have remained free from permanen infection. Early suprapubic cystotomy as advocated b Thomson Walker[1] will prevent ascending infection, bu as carried out under war conditions in the first f days after an injury it frequently results in a low leak fistula which neither keeps the patient dry in the e stages nor prevents a contracted bladder later on. method of waiting for overflow incontinence to occur good one in that it recognises that the emptying of bladder is not a matter of urgency in these cases, overflow developing in the first 48 hours is a satisfac solution of the immediate problem. It has the especially in women, of allowing leakage of urine anæsthetic areas; moreover prolonged overdist may damage the detrusor musculature. Sup aspiration through a serum or lumbar-puncture offers a safe method of emptying a painful dist bladder, but the danger of extravasation prev repeated use, and the needle *cannot* be left in po while the patient is transported.

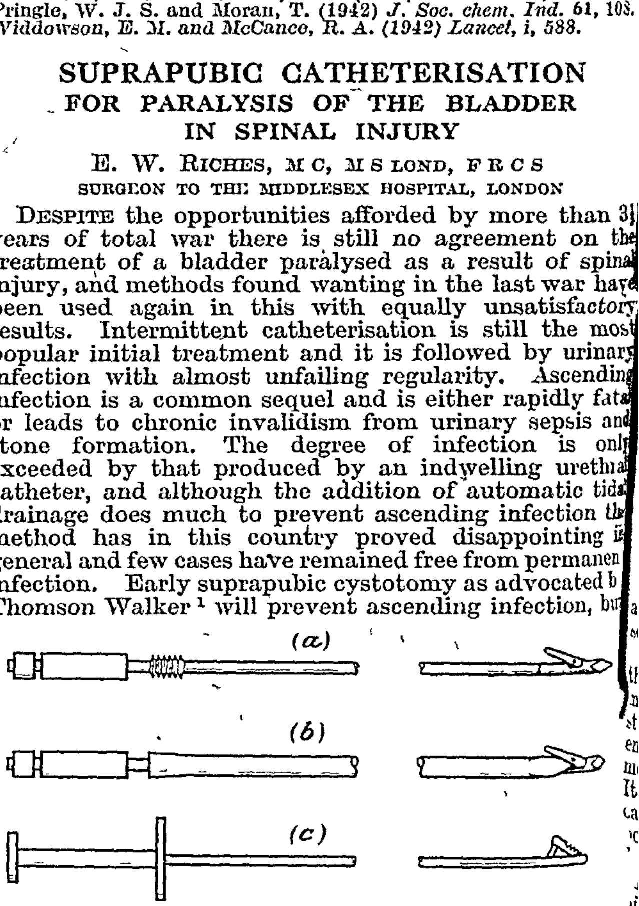

Fig. 1—(a) Introducer with knife-blade open, and (b) with catheter in position; (c) advancer.

The logical solution would appear to lie in the duction of a small suprapubic catheter which will leakproof junction and which can be left securely in the bladder; if it will also serve for the later treatment of the condition so much the better. A safe and rapid method of suprapubic catheterisation has now been devised; it has been used successfully as a means of bladder drainage in more than 20 surgical cases and in a few spinal cases, and it promises to fulfil the required needs. The object of this preliminary communication is to describe the method so that others may try it.

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[1] Thomson Walker, J. W. *Lancet*, 1917, i, 173.

SUPRAPUBIC CATHETERISATION

The catheter used is a rubber Malecot, size 16 (F), with the tip cut off obliquely to give it a terminal eye. It is 11½ in. long and is marked at 2, 3, 4 and 5 in. from the tip. A rubber shield, size 8, with a fully curved tube holds it in position.

Two special instruments are required, an introducer and an advancer (fig. 1). The introducer is a stainless steel trocar 15½ in. long which fits inside the catheter. Near the point is a small knife-blade which can be opened and closed by a screw at the upper end. On the back of the blade is a transverse bar which fits into a groove when the knife is closed. The knife serves the dual purpose of enlarging the opening made by the trocar point enough to let the catheter slide in easily, and, by means of the bar, of gripping the point of the catheter in the groove so that the self-retaining wings can be obliterated by stretching. There are serrations at the upper end below the screw to grip the catheter so that it can be held in the stretched position.

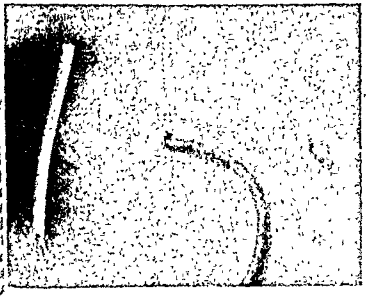

Fig. 2—Suprapubic catheter 5 months after introduction. The tape marks the level of the symphysis.

The advancer is necessary because after introduction the catheter is tightly held by the abdominal wall and must be pushed farther in. The advancer is a stainless steel tube ½ in. shorter than the catheter. At its lower end is a roughened expansion which can be projected by means of a spring-controlled button at the upper end. It can be made to grip the inside of the lumen of the catheter and the latter can be pushed into any desired position, the rubber head leading so that no damage is done.

[illegible] ieter are sterilised by [illegible] in position five months [illegible]

[illegible] note that suprapubic [illegible] is only to be used for a distended bladder.

1. The foot of the bed or table is raised to bring the patient to a partial Trendelenburg position.

2. The highest point of bladder dullness is found by rcussion. The site of puncture is at this point, or at the id-point between the umbilicus and the symphysis, which-er is the lower. A high opening gives an oblique track and better fistula.

3. A local anæsthetic is injected if necessary, the skin, tus sheath and bladder wall being infiltrated. Urine may aspirated to show the depth of puncture required to reach bladder.

4. A tiny incision may be made in the skin if desired. The introducer with the catheter stretched on it and well ricated is passed in a downward and backward direction, king an angle of 45° with the abdominal wall. It must not passed directly backwards.

5. It can be felt to enter the bladder and is passed to the 5 in. mark. The upper end of the catheter is released from the serrations; the knife is unscrewed (one full turn) so that the head of the catheter is released and recoils clear of the blade. The knife is closed by the screw and the instrument withdrawn, leaving the catheter in situ.

Fig. 3 — Suprapubic catheter held in place by a rubber shield.

6. The advancer is inserted into the catheter, its end is expanded by pressure on the button, and the catheter is pushed on to the 5 in. mark (in an average case). This brings the head just clear of the bladder base.

7. The shield is threaded over the catheter with the aid of a small artery forceps; there is a little escape of urine from the catheter during this manœuvre. The shield is fixed to the abdominal wall by two pieces of strapping (fig. 3).

8. The bladder is allowed to empty slowly for 48 hours. This may be done by intermittent removal of the spigot, or if the patient is in hospital by a Kidd's U-tube or a drip bulb. The initial slow emptying is necessary until the track is sealed off and prevents the complication of a contracted bladder at a later stage.

9. After 48 hours the catheter is connected to a tidal drainage apparatus.

10. After 10 days the catheter can be changed; it is removed and replaced by a size 16 whistle-tip catheter. The shield is used again. No instrument is required for this or subsequent change of catheter.

TIDAL DRAINAGE

The completely leak-proof fistula produced allows automatic tidal irrigation to be combined with suprapubic drainage without the disadvantages of a urethral catheter. Many forms of tidal drainage apparatus have been described; all will work if properly looked after but none is foolproof. The type here illustrated (fig. 4), called the "double Y," has been in use for more than two years and combines a cystometer and automatic tidal irrigator. It employs the principle of the Lawrie and Nathan[2] apparatus with the substitution of a manometer (M) leading from the siphon tubing for the air vent in the drip-bulb. Both Y-tubes are inverted, and entering fluid passes upwards; any air with it will pass out from the stem of the Y to reach the siphon tube (S) and none enters the bladder. All the tubing, including the manometer, is of wide bore (8 mm.). The screw-clip (C) can be used to narrow the entrance to the [illegible]

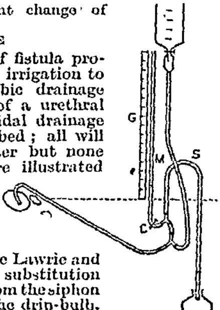

Fig. 4—Double-Y type of tidal drainage apparatus.

The whole apparatus is mounted on a metal stand placed beside the bed; the height of the siphon tube and of the metre stick (G) which acts as the cystometer gauge are adjustable.

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2. Lawrie, R. S. and Nathan, P. W. *Lancet*, 1939, ii, 1072.

The apparatus is sterilised and tested by being run through with 1 in 60 carbolic, a balloon or finger cot being used as the bladder. It is subsequently dismantled and cleaned once a week at the time the catheter is changed. The siphon tube is usually set at the height required to give a fill of 250 c.cm. as determined by the cystometrogram.

There are some fundamental necessities for the satisfactory working of any tidal drainage machine :

(*a*) The catheter must be maintained in the right position ; this is easy with a suprapubic catheter.

(*b*) All air must be excluded by having the bladder and tubing filled with fluid before connecting up the catheter.

(*c*) There must be no sagging of the siphon tube on its way to the waste receiver.

(*d*) The exit of the siphon tube must not dip below the level of the waste fluid.

Provided the tidal drainage is maintained in good working order, the urine can be kept clean and the bladder free from anything more than a mild infection.

Suprapubic drainage does not prevent the return of voluntary micturition or the development of periodic reflex emptying ; if permanent drainage is indicated the small catheter will serve as long as the bladder is clean. Larger sizes can be substituted gradually if necessary.

CONCLUSIONS

After its paralysis from spinal injury the bladder should be allowed to distend.

When it is distended suprapubic catheterisation should be performed.

Tidal drainage should be added after two days.

The use of a urethral catheter in the treatment of the paralysed bladder should be forbidden.

It is a pleasure to express my thanks to Mr. R. Schranz of Genito-Urinary Mfg. Co. for his skill in making the instruments for suprapubic catheterisation, to my house-surgeons for their part in the development of the tidal drainage apparatus, and to Mr. R. H. Percival, FRCS, for the photographs.

Reviews of Books

Psychiatry in Medical Education

FRANKLIN G. EBAUGH, MD, professor of psychiatry in the University of Colorado ; CHARLES A. RYMER, MD, associate professor of psychiatry in the university. (Oxford University Press. Pp. 619. 20*s.*)

PSYCHIATRY has gained for itself a far more prominent position in medical schools of the United States than is accorded it in this country. The steps by which this position has been attained, and the many difficulties encountered on the way, are fully described in an invaluable survey recently published by the Commonwealth Fund, which sponsored the investigation on which it is based. Candour is essential in a work of this sort : rosy pictures of harmonious progress, with psychiatrists crying pæan while anatomists, surgeons, and physicians gladly yield place—and teaching time—scarcely carry conviction. Professor Ebaugh and Dr. Rymer make no attempt to gloss over problems occasioned by the disparity between the immense importance and range of the psychiatrist's subject and the relatively slender amount of accurate and certain knowledge which he can offer his pupils. The relationship of psychiatry to the medical curriculum as a whole, and to psychobiology or psychology, are reviewed without bias and there is an informative note on methods of selecting medical students. The allocation of time to preclinical and clinical teaching of the undergraduate, the subjects to be covered in giving him an adequate notion of psychological medicine, and the ways of overcoming inevitable difficulties are the topics of the large section called " general psychiatric education." The frankness of the approach can be gauged from such headings as " why the medical student does not like psychiatry " and " the problem of psychiatric terminology " : the issues are not burked. There is a chapter on opportunities for teaching psychiatry in a general hospital. A separate section is devoted to the training of doctors who mean to specialise in this branch of medicine : one very full and instructive chapter in it deals with the postgraduate education qualifying specialists for recognition by the American Board of Psychiatry and Neurology. It is noteworthy that this recognition, corresponding to our own DPM but more exacting in its requirements, had been given to 1062 persons between May, 1935, when it began, and January, 1941 : of these, 566 were certified as specialists in both neurology and psychiatry, 56 others in neurology alone, and 440 others in psychiatry alone.

Canned Foods

An Introduction to their Microbiology. J. G. BAUMGARTNER, senior bacteriologist to Crosse & Blackwell. (Churchill. Pp. 157. 10*s.* 6*d.*)

THIS little book covers the essential microbiology of canned foods and also deals with canning operations, the laboratory examination of canned foods, and the examination of can seams. The principles of heat-processing are clearly discussed in less than 20 pages. More information might have been supplied on the process times necessary to kill organisms other than *Cl. botulinum*, since this is not the only organism involved. Little is said about the effects of different processing times and temperatures on heat-resistant bacterial toxins, an important point bearing on poisoning of toxin type. Most of the book is concerned with spoilage bacteria and their control but there is a useful, if brief, chapter on bacterial food-poisoning. The pictures are all informative and really illustrate the text.

Year Book of Dermatology and Syphilology 1942

Editors : FRED WISE, MD, MARION B. SULZBERGER, MD. (Year Book Publishers ; Lewis. Pp. 645. 19*s.*)

THIS useful book keeps up the standard of previou years. Aspects of dermatology and the venereal disease which assume added importance during war-tim naturally fill a large section. The editors contribute a comprehensive survey of the treatment of burns which shows how fluid opinion is in this important branch o military medicine. Subjects receiving increased atten tion include industrial skin diseases, scabies, and the public health and military aspects of syphilis. The usual features of peace-time editions are maintained.

Human Pathology

(6th ed.) HOWARD T. KARSNER, MD. (Lippincott Pp. 817. 63*s.*)

THIS edition more than maintains the high reputatio of previous issues. Nearly half the book has been re written and the whole has been revised and reset. The book is built up in two sections, general and systemati Close on five hundred illustrations, sixteen being colour plates, are mostly histological, and are of high standar Professor Karsner breaks away from the morphologica tradition, combining the clinical approach to disea with the modern biochemical outlook. Though this is a standard textbook for students and practitioners authors' names are given in the text and at the end of each chapter is a useful bibliography. It is a well-poise piece of work; no subjects of importance are left untouche and all are treated fairly. The book is as up to date a it is possible for so comprehensive a volume to be; weighs close on 4½ lb. so that it cannot be recommend for the knee or the railway carriage.

Laboratory Directions in Biochemistry

VICTOR C. MYERS, MD, PH D, D SC, professor of bi [illegible] Western Reserve University. (Kimpton. Pp. 288. 18

EVERY practical textbook is modified by the tea to allow for differences in syllabus and laborat facilities, but few would think it useful to publish th own notes of the kind, made for their own stud There is thus little hope that the loose-leaf alm cyclostyled volume from the American laboratory find a place in the English schools and colleges. T collection, though no doubt first class, is—from the E lish point of view—far too elaborate. The name Victor Myers is associated with the early advances blood chemistry. The laboratory methods he descri are unsuitable for English students partly because amount of time given to biochemistry in Ame medical schools is much greater than in ours, and pa because laboratory facilities for students are much m extensive in the lavishly equipped colleges and sch of America. As a reference book it is unsatisfa because it has no proper index.

THE LANCET

LONDON   SATURDAY, JULY 31, 1943

GAS GANGRENE IN THE MIDDLE EAST

Medical administrators, surgeons and pathologists can all learn much that is new or needed re-telling from Major J D **MacLennan**'s account of anaerobic infections of war wounds, concluded in this issue The story begins with a reiteration of the frequency with which war wounds are found to contain sporing anaerobic bacilli (clostridia), the incidence in the Middle East was 20–30%, but members of the gas gangrene group with the exception of *Cl welchii* (23%) were rarely present In about 5% of these contaminated wounds, usually where there is extensive damage to soft tissues, an anaerobic cellulitis develops after an incubation period of 3–4 days This is a definite infection with much gas formation but still no invasion of healthy tissue and with little systemic upset The anaerobic flora is now more varied, with the proteolytic *Cl sporogenes* a common finding No doubt anaerobic cellulitis has in the past been diagnosed as gas gangrene because of the extensive gas production, yet **MacLennan** makes the point that where there is abundant gas in the wound extending diffusely between muscle layers, with subcutaneous crackling, the condition is almost certainly not gas gangrene Climatic conditions in the Middle East may, of course, favour excessive gas production in this type of infection The picture may be modified for the worse (with local pain and toxæmia) by concomitant pyococcal infection, but a wrong diagnosis should not be made if it is remembered that in anaerobic cellulitis the muscle is always normal and contractile

MacLennan divides the actual infections of muscle [illegible] for which he suggests the [illegible] classical gas gangrene) and [illegible] myositis The second is a newly defined clinical entity characterised by massive infection of muscle, extensive exudate and some gas formation causing œdema and local pain, and progressive toxæmia, an anaerobic streptococcus is blamed as the primary causative organism, although aerobic pyogenic cocci have always been present as well The main points distinguishing streptococcal from clostridial myositis are its longer incubation and insidious onset, usually with cutaneous erythema and more discoloration of skin than muscle, particularly if the associated organism is *Strep pyogenes* The affected muscle is at first pale and boggy, then bright red changing to dark purple, which contrasts with the boiled coagulated appearance in gas gangrene, except terminally, it reacts to stimuli Smell is neither so sweet nor so pungent as in clostridial myositis, and, most important a stained film of the affected muscle shows large numbers of streptococci and many pus cells Although rare, streptococcal myositis must be differentiated from true gas gangrene, since its treatment is by massive doses of sulphonamides and extremely conservative surgery Its pathology needs more attention, particularly to see if there are points in common with the septic thrombophlebitis with which the anaerobic streptococcus has usually been associated

MacLennan's principal contributions to knowledge of gas gangrene are these a clearer clinical distinction among the infections caused by the different toxigenic clostridia, confirmation that *Cl histolyticum* is an important contributor to gas gangrene and the demonstration of a synergistic action when more than one of these anaerobes is present The greater frequency of *Cl œdematiens* infection in the Middle East has allowed a more precise picture of its features to be formed The incubation period is long (average 5¼ days compared with 23 hours for *Cl welchii*), the first symptom may be a feeling of weight in the limb, followed in 2–8 hours by considerable local pain due to a conspicuous spreading œdema accompanied by yellowish serous exudate, rarely if ever blood stained Gas is absent or minimal Toxemia is severe, with low blood pressure, little pyrexia and a tendency to hæmoconcentration The muscles, at first grossly swollen, slimy and pale, later become dark purple, friable and almost deliquescent The relatively high incidence of œdematiens infection in the Middle East is difficult to explain Although second to *Cl welchii* in its incidence in cultivated soil, it was rarely recovered from soiled or unsoiled desert or from the men's clothing, but the fact that it is more viable than *Cl welchii* in the desert may have contributed to its prevalence in gas gangrene Even so, we must not forget that *Cl welchii* was still the commonest anaerobe causing gas gangrene in the Middle East Regarding clostridial synergism, the most striking feature is the evil influence of *Cl histolyticum*, the position of which as a primary cause of gas gangrene has always been in doubt Of the ten cases of gas gangrene (all fatal) with which it was associated, this anaerobe was unaccompanied by other toxigenic clostridia in only one, which suggests that its main action is to encourage growth of the histotoxic anaerobes in virtue of its powerful proteolytic enzyme Indeed, proteolytic anaerobes were noticeably prevalent in the fatal cases of gas gangrene, and it is worth remembering that the most smelly cases are often the most dangerous Nevertheless severe gas gangrene—particularly that associated with *Cl œdematiens*—may be devoid of obvious smell

The disturbing part of this report is that dealing with prophylaxis and treatment Despite the lessened risk of infection from the terrain and the common use of sulphonamides prophylactically, the incidence of gas gangrene was estimated at 0 32% of all wounds, which may be compared with the 0 3–1% among the wounded in France in 1918 The best prophylactic of gas gangrene is early and radical surgery Battles of movement such as we have been witnessing may present difficulties to the medical administrator, but the recent broadcast by the Director General[1] about the modern organisation of the medical services in the field shows how these obstacles are being overcome, and indeed the troops have no complaint on this score It may be that the surgeon has pinned his faith too much to the sulphonamides, which have been disappointing both in prevention and in treatment, and has not been radical enough in the surgical toilet of the wound If so, he has had his lesson, and it cannot be too strongly urged that other prophylactic measures are no substitute for early and thorough debridement. About the prophylactic value of antitoxin it is less easy to be dogmatic. Of 113 cases reviewed by MacLennan, antitoxin had been given prophylactically to 13 only; there are no details about the interval after wounding when the antitoxin was given, or of the outcome in these cases; nor are there any data about similarly treated cases that did not develop gas gangrene. Prophylactic antitoxin may not prevent gas gangrene, but, if experimental evidence means anything, it should control its progress and severity. Surely the time has come for a large-scale controlled trial by the Army such as was instituted with promising results in 1918.[2] On the treatment side, a fatality of 50%, even allowing for greater accuracy in diagnosis, shows how little progress we have made in 25 years. Again, the worst prognosis goes with wounds of buttock and thigh, with a fatality of 67·7%; 58 of the 142 cases had fractures of some sort. Best results were obtained from combined serum and sulphonamide therapy, which corroborates the experimental findings of Henderson and Gorer.[3] Of the 66 cases given antitoxin, alone or with a sulphonamide, two-thirds recovered, compared with a recovery-rate of only 21% for those given sulphonamides or nothing. Indeed, of the 21 fatal cases receiving antitoxin, 18 could not fairly be said to have died because of ineffectiveness of the treatment. Massive doses intravenously are recommended and sulphathiazole is the sulphonamide of choice.

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[1] Hood, Sir A *J R Army med Cps* June, 1943 p 237

MacLennan says nothing about the methods by which these many anaerobes were isolated and identified; it is a story of great labour and skill that bacteriologists eagerly await. Meanwhile, its high quality and endeavour make this work, Montgomery-like in its thoroughness and finish, a notable contribution to medical literature.

DRUGS FOR TROPICAL DISEASES

Since major campaigns of the British and American forces are taking place in tropical or subtropical regions, the proper use of modern drugs in the prevention and treatment of tropical diseases must be an important factor in their success. The subject is one to which Warrington Yorke made many distinguished contributions, and his unexpected death was deplored by many of those who spoke at the Royal Society of Tropical Medicine and Hygiene on July 14. The chief speaker, Colonel S. P. James, discussed modern views on the treatment of malaria by quinine and mepacrine (‘Atebrin’). No drug is yet available which will prevent infection taking place when a susceptible man is bitten by a mosquito, but quinine or mepacrine can prevent the infection from developing into the clinically recognisable disease (suppressive treatment or prophylaxis), or cut short the actual attacks of malaria (curative action). In neither case is it possible to kill off all the malaria parasites in the body; sooner or later when the drug has been discontinued they will begin to multiply again, causing a relapse. Complete cure is attained only by the development of immunity in the patient after a number of these attacks. To control the clinical manifestations of the disease, small doses of the drugs are sufficient—e.g., gr. 10 of quinine or 0·1 g. of mepacrine three times a day. Larger doses produce no greater therapeutic result, but merely exert a toxic influence on the patient, who exchanges the poison of the physician for that of the parasite. The drugs at present known control only the forms of malaria parasite found in the blood during the acute attack; they do not influence the sporozoites injected by the mosquito when it bites, or the obscure cycle which links the sporozoites with the later forms in the blood. More research on the biology and chemotherapy of malaria is needed, research which has been neglected in this country during the last thirty years. As Colonel James remarked, foreigners have expressed surprise that the wealthy British Empire, which probably suffers greater harm from malaria than any other community, has been content to depend on the Dutch of Java for its quinine, and on the German chemists for its synthetic antimalarial compounds.

The older forms of chemotherapy, such as for malaria and sleeping-sickness, have something to learn from the principles evolved by experience with sulphonamides. Thus, the rational use of synthetic antiprotozoal drugs is greatly facilitated if their blood concentration can be estimated and the dosages regulated accordingly. In the case of suramin (‘Bayer 205’) and ‘Antrypol’ for sleeping sickness, this is already possible through the work of A. C. Wormall; and the treatment of Europeans affected with the disease ought to be controlled in this manner to avoid the disastrous relapses which may arise in patients who fail to retain the compound in adequate amounts. In the case of mepacrine for malaria, similar methods will shortly become available and the accepted doses may need revision. A second principle derived from experience with sulphonamides is the rule of starting treatment with a large initial “loading” dose. In this way the delay of raising the blood concentration to its effective level by a gradual accumulation of small equal doses can be avoided. Such a practice might well be adopted when mepacrine is administered for an acute attack of malaria. Instead of giving the customary course of 0·1 g. three times a day for five days, whereby an effective concentration in the blood is probably not reached until the second day, the first dose might well be 0·6 g. (or even 0·9 g.), subsequent doses being correspondingly reduced. Intramuscular injections o mepacrine are sometimes necessary, and are effectiv in rapidly getting the drug into the blood, but the always cause a certain amount of necrosis at the sit of injection, and should be avoided when possible Malaria was an important military factor in the la war, especially around Salonika, and apparently looms large in this war also. According to a rec broadcast by a member of the Australian government 80% of the Australian troops landed in New G went down with malaria. Although details abou other localities are rightly withheld, it requires litt imagination to visualise the handicap to militar operations and the losses in efficiency and lives whi this disease must be causing. Money used in th search for weapons to combat such a deadly mena is money well spent.

About the other diseases of our forces in the tro Major-General A. G. Biggam gave more cheering new For the treatment of bacillary dysentery sul guanidine has been very satisfactory; in most patients the disease is rapidly cut short. Succinylsulphathiazole (sulphasuxidine) is equally effective, but presumably the supply is more limited. Sulphapyridine and sulphathiazole are also effective but they are more likely to cause vomiting and blockage [illegible] Sulphanilamide is ineffective. [illegible] has also been tried in typhoid fever; against the infection itself it is powerless, but it may help to prevent distension, although this is not certain. Kala-azar in the Sudan responds well to stilbamidine (introduced by WARRINGTON YORKE) but unless the solution is freshly prepared toxic reactions may occur. Tropical ulcers, which mostly affect the legs and are an important cause of disability among native workers, have been much improved by the local application of penicillin, although the supply is too limited for this treatment to be used extensively. Relapsing fever due to *Treponema recurrens* has given trouble in Abyssinia and the Middle East; in some places, the response to neoarsphenamine has been disappointing, and acetarsol, tryparsamide or bismuth have proved more satisfactory.

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[2] History of the Great War: Medical Services, Pathology, London, 1923, p. 95. See also *Lancet*, 1941, i, 419.

[3] Henderson, D. W. and Gorer, P.A. *J. Hyg., Camb.* 1940, 40, 345.

MIDWIFE AND MIDWIFERY

IT was only forty years ago that the state first entered into a contract with the midwife that if she would comply with certain standards and accept supervision the care of normal childbirth should be hers without unqualified competition. The standards were not very high, and the status and pay were correspondingly low; but the standards have risen as the period of pupilage crept up from three months to two years. Status has risen too, with the award of a badge to carry the honourable cipher SCM, although without distinctive gown. And pay was also rising, but by no means in like proportion until the pressure of short supply began to take effect. Not however until the shortage of practising midwives threatened to become acute did the state intervene to set up a national scale of salaries and emoluments, and then only after a curious period of inability on the part of the Ministry of Health to distinguish between the midwife and the nurse. Having discovered that midwifery is a profession distinct from nursing, with a College of its own, the Minister has made handsome amends by accepting in principle the recommendations of the Rushcliffe Committee, published as a white-paper[1] on July 22, coupled with assurance that the new scales—which are to cost at least half a million (see p. 140)—would be retrospective to April 1. The basic salary of a district midwife will be £120 (£140 if she is SRN)—£10—£190, plus living allowance £100, total £220–£290; and we quote this figure only because if there are plums in her calling the prospect of getting one is small indeed, and it is essential to offer a salary that will encourage entrants of quality to make district midwifery their career. The midwife is to be provided with uniform, to work reasonable hours (a 96-hour fortnight as soon as feasible), and to be assured of 28 days' annual leave with pay, and substantial sick pay. The two material conditions advocated by the Central Midwives Board (in an unpublished report) to meet the scarcity have thus been fulfilled; the third, an elusive one, is a rise in the public regard for midwives. There are 65,000 names on the Roll of Midwives for England and Wales. A bare third of these women would be ample to staff the whole maternity service, but many nurses take the CMB diploma simply to enhance their position as nurses and some hospital authorities still insist on the double qualification for posts in which it is not required. Hundreds of those enrolled have not found it worth their while to practise. The Rushcliffe report comments how slow has public opinion been to realise the vital part played by the midwife today in the health services. They are certainly on the mark in suggesting that a franker and more enlightened attitude towards childbearing should be one of the first aims of health education. The frankness might begin with the English language. The word midwife may not have the nobility of the French *sage femme*, but it is good honest Saxon; can the same be said for the " midifri " of cultured speech? It does not carry on the air, nor from the platform; better almost the medical student's " midder." Are we too refined to give it the value of the broad vowel of " refinery "? Then, perhaps the midwife might be put in undisputed possession of the amended word to describe her profession, for she has no other. "Midwifery, *see* obstetrics," says Dorland's dictionary, and neither does the Royal College, nor the obstetrical journals, nor any university diploma lay claim to it. Would the Irish Colleges and the Society of Apothecaries with their customary grace give *place aux dames*?

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[1] Report of Midwives Salaries Committee. Cmd. 6460, pp. 37, 6d.

Annotations

UNDER-WATER BLAST

DEPTH charges, mines and bombs produce a sudden wave of positive pressure which may be fatal or incapacitating to men swimming or floating nearby. Accumulating experience now allows these hazards to be defined more clearly and gives some indication of the most suitable treatment and perhaps of the lines along which protective measures might be instituted. British[1-5] and American[6-10] observers agree with Goligher and his colleagues in this issue that the effects of blasts under water closely resemble those in air. In both groups, lung damage is often present and may be serious, if not fatal, but the lung lesions in water are not so severe nor so frequent as in air. In water, the respiratory symptoms may be slight and overshadowed by the abdominal ones, which may set in shortly after the explosion and range from cramps to severe pain with sometimes vomiting and diarrhœa. The intensity of abdominal pain is a fair measure of the gravity of the injury.[6] In milder cases the pain lasts a few minutes and the men are able to move about and help in rescue work. Occasionally there is an urgent desire to defæcate or pass water. Severe testicular pain is sometimes complained of. After a short interval, symptoms of shock develop and it becomes apparent that an acute abdominal emergency has arisen. Tenderness of the abdomen, board-like rigidity, absent peristaltic sounds, reduction of liver dullness and increased pulse-rate call attention to an abdominal catastrophe and indicate the need for urgent treatment. In less severe cases, the patient shows less degrees of abdominal injury, his symptoms subsiding with conservative treatment. In the least affected cases respiratory features may be more prominent than abdominal and the effects of immersion may even dominate the picture.

From [illegible] study of [illegible] rative findings and [illegible] possible to say [illegible]

[illegible] 8, 199.

[illegible] King, D. P. Brit. med. J

3. Cameron, G. R., Short, R. H. D. and Wakeley, C. P. [illegible] *Surg.* 1942, 30, 49; *Ibid*, July 19[illegible]

water explosions do to the body. Experimental investigations [3 9 10] have contributed useful information. The key to the pathology of water-blast injury lies in the tearing of certain soft tissues, especially blood-vessels, leading to hæmorrhage, often extensive. Viscera containing air or gas are most commonly involved, though solid tissues do not always escape. Large parts of the lungs may become consolidated with effused blood, and respiratory embarrassment follows. Hæmorrhage into the wall of the alimentary canal, especially of the small and large intestine, and less often the stomach, duodenum and lower œsophagus, or into the retroperitoneal tissue, with associated perforation, is the most common lesion. It requires no ingenuity to associate these structural changes with the clinical course. With perforation there is imminent danger of peritonitis. Severe contusion of the gut may be followed later by perforation or peritonitis. Volvulus, peritoneal hæmorrhage and peritoneal abscess have been described. What still remains a puzzle is how the lesions are produced and why they arise where they do.

Treatment must be decided by the progress of the case. If there is pulmonary damage alone, rest and quiet, oxygen administration if dyspnœa and cyanosis appear, and a careful watch for the onset of bronchopneumonia are advised. X-ray examination is of value in determining the extent of lung injury. Pulmonary complications call for serious consideration in deciding whether transfusions of plasma or blood should be given in shocked cases and in choosing the anæsthetic when operation is necessary. If the blood-vessels of the lungs are severely injured, plasma or blood may increase the bleeding into the lungs. An anæsthetic may reinforce a predisposition to bronchopneumonia or aggravate shock. Goligher, King and Simmons (see opening page) regard ether—pure or combined with nitrous oxide and oxygen—and intravenous barbiturates as unsuitable, and point out that chloroform and spinal anæsthesia have disadvantages when shock is severe. Cyclopropane is perhaps the anæsthetic of choice, but open ether has proved satisfactory when there are no chest complications; spinal anæsthesia also has its uses. In cases with perforation of the gut it may be possible to suture the tear satisfactorily, but when gut lesions are multiple, as is not uncommon, resection of the affected segment may be necessary. Postoperative care is along the usual lines, special attention being given to the chest conditions. In non-perforating cases, expectant treatment is satisfactory since most of the gut lesions heal with few after-effects. Effective protective measures are badly needed. Goligher and his colleagues advise the seaman to concentrate on getting as far from an impending explosion as possible, swimming on his back if this will not delay him. Greaves and others [9] have produced experimental evidence of the protective value of kapok and foam rubber coverings, and suggest that the ordinary life jacket made of kapok or similar material with slight modifications to cover the abdomen might meet requirements. Friedell and Ecklund [10] claim that a rigid chest covering protects animals against lung injury. Further work on these lines may well save some lives among a class of men who deserve every consideration.

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4. Williams, E. R. P. *Ibid*, 1942, **30**, 38.
5. Wakeley, C. P. G. *Lancet*, 1943, i, 244.
6. Palma, J. and Uldall, J. J. *U.S. Nav. med. Bull.* 1943, 41, 3.
7. Pugh, H. L. *Ibid*, 1943, 41, 9.
8. Ecklund, A. M. p. 19.
9. Greaves, F. C., Draeger, R. H., Brines, O. A., Shaver, J. S. and Corey, E. L. *Ibid*, 1943, 41, 339.
10. Friedell, M. T. and Ecklund, A. M. *Ibid*, p. 353.

FINGER SQUEEZING CONDONED

It has been an axiom of hæmatology to insist on free-flowing capillary blood if the samples taken by pricking the finger are to be reasonably accurate. Yet how often have we squeezed the finger to coax that last drop out to fill the remaining pipette, feeling guiltily how far this falls short of the perfect sample. But Peterson, Strangeways and Jordan [1] actually condone the practice and with cold statistical accuracy show how little it matters, at least for hæmoglobinometry. Using a photo-electric absorptiometer that gave an accuracy—represented by the standard deviation—of 0·14 g. Hb per 100 c.cm. blood, they found that with blood rendered temporarily static by a constricting band the accuracy was about 0·4 g. per 100 c.cm.; with free-flowing blood the same result for mean hæmoglobin content was obtained but accuracy was better, 0·28 g. per 100 c.cm.; squeezing the blood through needle punctures still gave the same result but accuracy was slightly less. Prolonged stasis of course caused serious errors. From the clinical point of view figures of this order are of no significance; so we can continue to wind our rubber-bands round the finger and even squeeze, if need be.

GOITRE IN TIPPERARY

Hellmuth v. Moltke, when assured by his staff that his armies had won resounding victories, asked "Where are the guns and the prisoners?" A lack of concrete evidence makes personal impressions suspect, however startling they may be. When the investigators of the Medical Research Council in Ireland [2] report that in the South Riding of co. Tipperary 50% of children in certain districts are goitrous, and at the Cashel Industrial School nearly 90%, one naturally looks for evidence of cretinism and mental deficiency. It is said that the goitres are not associated with either. Further, the results of iodine treatment have not been dramati and preliminary investigations of the iodine content o foods did not disclose any gross deficiency. It seem likely, therefore, that the goitres are hypertrophic, and in all probability physiological. Different observer vary considerably in their opinion about what constitute a goitrous thyroid gland; it is unfortunate that the gland, being near the surface, is liable to be labelled diseased on account of minor fluctuations in size. McCarrison [3] found at the Lawrence Military Asylum, Sanawar, that no great variation in goitre incidence took place during the tenure of any one medical officer In 1905–07 there was a so-called epidemic. The figure for 1904 were 5% for girls and 4% for boys, but the jumped to 51% for girls and 42% for boys in the following year when a new medical officer arrived, and remain excessively high throughout his period of office, fallin considerably in subsequent years under different officers. Turton [4] pointed out the lack of uniformity of standards in goitre surveys, and in his goitre survey Derbyshire ignored the incipient enlargements whe the isthmus or lobes are seen or felt as a slight th on inspection, or observed on deglutition. In his vi the incidence of childhood goitre was only of value evidence of prevailing thyroid disease when consider in relation to the prevalence of cretinism, the propo of the sexes affected, and the incidence of goitre in adult population. Many childhood goitres disappe spontaneously. In Derbyshire as many as 48% eit decreased or disappeared without any treatm whatever. It is a mistake to regard the thyro activity as being concerned solely with the metabol of iodine. Williamson and Pearse [5] have shown there are at least two sides to its activity—secretion colloid storage—and they are not synonymous. Ende goitre may take more than one form. Hypertrop goitre may be, and often is, a purely physiolog enlargement between 9 and 16 years. The nod parenchymatous goitre is probably a later stage of

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1. Peterson, J. M., Strangeways, D. H. and Jordan, R. C. *J. ph* 1943, **102**, *Proc. physiol. Soc.* 5P.
2. Report of the Medical Research Council of Ireland, 1942.
3. McCarrison, R. *Ind. J. med. Res.* 1914, **1**, 505.
4. Turton, P. H. J. *Lancet*, 1927, ii, 1170. *Proc. R. Soc.* 1933, **26**, 33.
5. Williamson, G. S. and Pearse, I. H. *J. Path. Bact.* 1925, 361.

ype. Being chiefly secretory in type, and a true ypertrophy, it can have no relation to iodine deficiency, or iodine is not an essential constituent of the secretory issue of which the hypertrophy is composed. Impure water-supplies, insanitary conditions of life and deficient diets are associated with this type in endemic zones The lymphadenoid type was found by McCarrison[6] to be associated with diets containing more than 60% of white flour or vitamin poor carbohydrate, 20% or less of protein, 8–10% of vitamin-poor fats, and inorganic alts (including iodine) in adequate amounts. Ogilvie[7] ound goitre in Scotland to be associated with poor diets in coal miners, who consumed prodigious quantities of soured milk. The only type of endemic goitre which s amenable to iodine treatment is the diffuse colloid or vesicular goitre, in which secretory tissue is *entirely absent.* This kind is found in the newborn of goitrous mothers, in cretins and in cretinoid infants. In its progressive stage it is not found after 18 years of age; he major incidence is between 11 and 14 years The condition is a wide departure from the normal Iodine s locked up in the colloid; the total amount of iodine n the dried gland may amount to as much as 0 27%. While iodine deficiency may play some part in the etiology of this type of goitre, imbalance of calcium and phosphorus as well as of iodine certainly has a good deal o do with it. It is not without reason that water-supplies derived from the carboniferous system of Derbyshire have been so greatly concerned with a high ncidence of goitre at all ages. For these reasons there s no justification for the promiscuous administration of iodine to school children merely because of the prevalence of thyroid enlargements. The hypertrophic ype will not be benefited unless all of the factors operating in its causation are corrected, and it has been shown that an excess of iodine may be one of them. Secondary Graves's disease is too often a misapplication of iodine therapy to hypertrophy of the thyroid gland, especially n adolescents, and the continuous use of iodine can do nothing but harm to the critically balanced hypertrophic goitre of the young.

BOYS IN THE PITS

EVERY bit of territory we take from the enemy we have got to find coal for, but many young miners have been drawn from the pits, and with the ageing mining population there has been an actual fall in coal output. Without drastic measures there will not be enough men and boys in the coal industry by the end of this year to carry it on The Minister of Labour cannot get the younger manhood for this work voluntarily, so he has told the Mineworkers Federation[8] that he may find it necessary to direct boys of 16–18 into the mines. Even before the war the mining industry was finding it increasingly difficult to attract young recruits In days gone by, in the mining villages, sons followed their fathers into pit work as a matter of course, but improved education and transport have opened the door to a wider field of employment, and mining has not withstood comparison with other livelihoods. Many fathers now say, as did Mr. OM SMITH'S,[9] "My lad will never go into the pit if I can stop him" War has aggravated the shortage, and even the return of 47,000 ex-miners from the factories and the option given to Army recruits to choose mining instead have left a gap of some 60,000 to be bridged. A great deal has been done to make mining less dangerous than it was a generation ago, but it is still an exacting occupation. Few, and perhaps least of all the Minister himself, will view with any enthusiasm this latest proposal, the general secretary of the federation urged a search for alternatives. If none can be found there must be effective arrangements for the welfare of these youngsters—supervision of the nature of their work, of the stresses to which they are exposed, and of their hours of labour. The special liability of young workers to accident must be borne in mind, and there should be a thorough pre-employment medical examination designed to prevent those obviously unsuited from being sent underground. Coal-mining is extremely strenuous, and the accident rate is five times the average for the rest of industry and six times that in factories. But fitness in this industry depends on mental as well as physical factors It is a common experience that young men forced into mining by economic or geographical necessity will break down mentally after an accident from which a complete recovery could normally be expected Boys of nervous or otherwise unsuitable temperament should therefore be as definitely refused employment in the mines as those with physical defects The Minister emphasises that the direction of young men to the coal industry does not mean that they will have to stay in it, the position will be reviewed after the war. It is inconceivable that in times of peace any compulsion of this kind will be tolerated, and if the industry is to surmount its recruiting difficulties in postwar years mining must be made attractive, and the colliery village must no longer be a place from which young people will run away as soon as their brains develop Measures for promoting health and safety in the industry were foreshadowed in the white paper on coal (Cmd. 6364) last year, suggestions to the same ends were made by the departmental committee which reported finally in July, 1942, and much work has been done by the Miners Welfare Commission. The recent strengthening of the mines medical service should also in time secure a substantial improvement in health. But meanwhile most of us will sympathise with the Mineworkers Federation in their resolution calling for immediate legislation to safeguard the health, safety and training of youth in the mining industry, and demanding a wage which will make adequate return for the hardships involved.

THE AIRMAN'S HANDS

EXPERIENCE has shown that gloves, however thin, are a valuable protection against burns of the hands, and airmen have been urged to wear their gloves at all times But quick delicate movements are most easily performed with bare hands, and men are apt to discard gloves in action, so serious hand burns are not uncommon. Mr. William Stannard, maker of the Stannard silk envelopes for the treatment of burns, has joined with the RAF medical authorities in providing a first aid outfit, packed to slip into a waistcoat pocket. The cover of the packet, being cut on the bias, can be ripped open diagonally in a moment, after a small slit has been made at each corner. The chief contents are a pair of sterile Stannard oiled silk gloves, dusted inside with antiseptic powder. They fasten closely round the wrist by means of a piece of bandage ending in a tab of adhesive plaster, and have separate compartments for the thumb and index finger, so that the man wearing them can still use his hands The remaining contents of the pack are anti-burn jelly for burns other than those on hands or face, two ampoules of morphine, a large wound dressing, and a safety pin. The first aid materials will withstand the effects of high altitudes and the cover of the packet is both fireproof and waterproof.

Mr. E. P. STIBBE, professor of anatomy in the University of London at King's College, died at his home in Gerrards Cross on July 23. He was 58 years of age

We also announce with regret the death on July 20 of Dr. FRED STOKER, consulting surgeon to Queen Mary's Hospital and a botanist of distinction. Doctors w[illegible] have alpine gardens hold his memory dear for his [illegible] duction to them of many small and attractive [illegible] To a larger circle he was gardening correspondent [illegible] *Times.*

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[6] McCarrison, [illegible]
[7] Ogilvie, G [illegible] Endemic
[8] Goitre in [illegible] for the
M D Edin
Times, July 21, p. 2
[9] See *Lancet*, July 3, p 28

Special Articles

ROYAL COLLEGE OF SURGEONS OF ENGLAND

CENTENARY OF THE FELLOWSHIP

The hundredth anniversary of the institution by Royal Charter of a fellowship which made the College of Surgeons an exemplar of surgical education in the whole kingdom was celebrated on July 21 at a gathering of stateliness and significance. The ceremony took place in the Great Hall of Lincoln's Inn, generously lent for the occasion by the benchers to their surgical neighbours whose own amenities had been destroyed by enemy action. The rain served only to enhance on the summer evening the green of the lawn outside and the beauty of the great plane trees, adjoining the Fields laid out by Inigo Jones. The King, as visitor of the Royal College, sent a message of congratulation, expressing his trust for the restoration of the Hunterian museum after the war, and the Princess Royal in her fellow's gown handed the scroll to the first recipient of the honorary fellowship. Twenty members of the College council, with their ladies, bid the guests welcome. Ambassadors of some of the Allied Nations were there, Mme. Maisky deputising for the Soviet Ambassador, as well as the Lord High Chancellor, the Lord President of the Council, High Commissioners of the Dominions, and members of the Government, including the Ministers of Health and of Food. Four masters of the Hon. Society of Lincoln's Inn, including Lord Clauson, attended. The Army and Air Force medical services were represented by their directors-general. The Sister Colleges, the Apothecaries, the Royal Society, the British Medical Association, the Royal Society of Medicine, the Royal College of Nursing, were all represented by their presidents, the Medical Research Council by its secretary, the Lister Institute by its director. Their presence, as Sir Alfred Webb-Johnson happily remarked, was evidence that the work of the College of Surgeons has an imperial and international as well as a national value.

In praising famous men Sir Alfred naturally paid special attention to the founder of the fellowship, Sir Benjamin Brodie (whose great-grandson was there to hear him), the son of a Wiltshire rector, who approached surgery through anatomy, and was the first surgeon to become president of the Royal Society. It was Brodie, with his philosophical turn of mind, who said in a presidential address that the first step in all physical investigations is the observation of natural phenomena; these observations, more than anything else, teach us the actual value and the right use of the imagination. No wonder that he should have required from candidates before admission to the final fellowship examination some proof of advanced knowledge of the basic sciences of anatomy and physiology. And so wisely did he plan the by-laws for the conduct of the examination that little or no modification has since been required.

Turning to the bestowal of honorary fellowships, the right to award which was granted by Royal Charter in 1899, the roll was, the President reminded his hearers, limited to 50. He was proud to announce that the Prime Minister had allowed his name to be enrolled. Recalling an American Ambassador's address to Lister, he applied to the new fellow the words: "It is not a profession, it is not a nation, it is humanity itself which, with uncovered head, salutes you." Mme. Chiang Kai-shek had also been chosen for this distinction in recognition of her services to humanity. Of the practising surgeons selected several were from the Dominions and Allied Countries; there were others still in the power of the enemy whose names must at present be withheld.

Fellowships Conferred

Prof. Innes Wares Brebner, mbe, mb edin, frcse
Surgeon, Johannesburg General Hospital, Witwatersrand.
Prof. Nikolai N. Burdenko, chief surgeon, Soviet Army
President of the Scientific Medical Council, USSR.
Colonel Elliott C. Cutler, chief surg. consultant, US Army;
Moseley professor of surgery, Harvard University.
Sir Hugh Devine, ms melb, facs
Past president, Royal Australasian College of Surgeons.
Sir Thomas Dunhill, md melb, facs, kcvo, Serjeant Surgeon to the King, cons. surg., St. Bartholomew's Hospital.
Prof. Evarts A. Graham, md rush, facs (Washington Univ., St. Louis), past president, Amer. Assoc. Thoracic Surg.
Colonel Johan M. Holst
Consulting surgeon to the Norwegian Army.
Prof. A. T. A. Jurasz, md heidelberg, frcse
Dean of Polish Medical Faculty, Edinburgh University.
Colonel J. A. MacFarlane, mb toronto, frcse
Consulting surgeon to the Canadian Army.
Prof. Naguib Mahfouz Pasha
Chair of gynæcology, Fouad University, Cairo.
Prof. H. C. Naffziger, md california, facs
Chairman, dept. of surgery, San Francisco.
Prof. Robt. B. Osgood, md harvard, facs
John Ball emeritus chair orthopædic surg., Massachusetts.
Sir Earle Page, pc, ch, mb sydney, fracs
Ex-Minister of Health and Prime Minister, Australia.
Prof. Wilder G. Penfield, md johns hopk, dsc oxfd, frs
Chair of neurology and neuro surgery, McGill Univ.
Sir Humphry Rolleston, gcvo, md camb, prcp (1922–26)
Ex-Chairman of the Imperial Cancer Research Fund.
Prof. Norman S. Shenstone, md columbia, facs
Chief, surgical service, Toronto General Hospital.
Colonel Henry Wade, dso, md edin, frcse
Ex-President of the Royal College of Surgeons, Edinburgh.
Prof. Sergei S. Yudin, i/c surg. service, Sklifassovski Hosp for Traum. Dis., Moscow.

Four of these were then presented to Sir Alfred Webb-Johnson and formally admitted as honorary fellows.

Professor Holst

(presented by Mr. Soutar, vice-president)

Mr. President,—I have the honour to present Johan Martin Holst, professor of surgery in the University of Oslo. The work of Colonel Holst covers a wide field and he has made distinguished contributions to the surgery of the thyroid and the stomach, whilst in the surgery of the lungs he has still further advanced the pioneer work of another great Norwegian surgeon Professor Bull. In happier days Norway was known to us as the Land of the Midnight Sun. When those happy days return it will rather be known as a land of a people whose courage never failed but even at the midnight of their fortunes shone bright above the horizon to warm our hearts. As a distinguished surgeon, but still more as the representative of a great-hearted nation, Professor Holst is worthy of the greatest honour we can bestow.

Mr. Henry Wade

(presented by Sir Girling Ball, vice-president)

Mr. President,—I present to you Henry Wad fellow and recent president of the Royal College o Surgeons of Edinburgh. His medical career started in the Army, for shortly after qualification he went to the South African War as a civil surgeon attached to the Royal Scots Fusiliers. He joined the Scottish Fo again in the Great War, rising to the rank of colo AMS, becoming consulting surgeon to the British Fo under Murray and Allenby in Egypt and Pales He was awarded the DSO and was decorated with t CMG and the Serbian order of the White Eagle. U to resist a desire for service in this war, he returned fro retirement to work for the EMS and to represent Scotla in advising the Ministry of Health on medical servic after the war. These military interludes have been great joy to Wade, who in the intervals built up a w reputation as a surgeon and one of the great teach of the Scottish school. For 17 years he was conserv of the museum of the RCSE. In 1924 he became surg to the Royal Infirmary and was associated with t great master of surgery, Harold Stiles. He has b an international reputation as a urologist and was of the founders of the urological section of the Ro Society of Medicine. When the time comes, may t great friend of our College retire to his Scottish castle, resume his agricultural and piscatorial pursuits, the knowledge that his work has been done to satisfaction of all British-speaking peoples.

Colonel MacFarlane

(presented by Maj.-General Max Page, member of cou

Mr. President,—I have much pleasure in introdu a colleague of mine, Joseph Arthur MacFarlane.

sultant surgeon to the Canadian Army overseas. Colonel MacFarlane has fine qualifications for the post he holds, for he served in the ranks of a field ambulance in the last

cliffe Infirmary and then at the London Hospital In 1926 he returned to Canada to join the staff of the Toronto General Hospital, and he has continued to work and teach with distinction at the institution until he came to this country in January 1940 in charge of the surgery of the 15th Canadian General Hospital. He has made important contributions to the surgery of the rectum and to traumatic surgery. His intimate knowledge of surgical work in the Field, coupled with his extensive hospital experience, ensured his success in the position he now holds, and his relationship with Army consultants in this country has been most cordial and helpful We are all delighted that the College has decided to confer on him this honour.

Professor Naffziger

(*by Surg. Rear-Admiral Wakeley, member of council*)

Mr. President,—I present to you Howard Christian Naffziger who enjoys an international reputation as a surgeon, and has made the branch of neurological surgery peculiarly his own. A true son of the American Pacific seaboard, he has, as Professor of Surgery in the University of California, made his surgical influence felt with student and practitioner alike. He is no stranger to Europe, for he served in the American Expeditionary Force during the first World War, and commanded the US No. 30 General Hospital. Past president of the American
fitting that he should receive
College from our President,

also of
nerican
National
an find
time to devote to editorial pursuits, but Naffziger is a member of the editorial board of the *Western Journal of*
, the *Annals*
gery, Gyneco-
accomplish-
abian horses,
riding and hunting whenever possible, and he engages in both deep sea and trout fishing. He also collects data and reads as much as possible on Leonardo da Vinci, and we hope it will be possible for him to see some of the English collections while he is in this country

* * *

In a moving reply Professor Holst spoke of the return of the Vikings a thousand years ago to their home land after visiting this country, carrying with them the priceless gift of Christianity. Colonel Wade pictured the return home, up Sardinia Street, of the Scottish divisions after this war to the skirl of the pipes

* * *

As they left the Inn, in which law and medicine had been so closely allied, the guests could fittingly ponder another of the President's remarks "There is one great difference between us We are our own law-givers, or rather, we must discover the laws on which our profession rests We must discover and not invent them, for the laws of Nature are not to be invented."

British Association of Physical Medicine.—At a meeting of the council the following officers were elected for its first year president and chairman of the council, Lord Horder, treasurer, Dr M B Ray, medical secretary, Dr. P. Bauwens, general secretary, Sir Frank Fox. The appointment of other officers will be made when the membership has been extended The council approved 50 new members Medical practitioners interested in physical medicine are invited to apply for membership The address of the association is 11, Chandos Street, London, W 1

SCOTLAND

HEALTHIER SCHOOL CHILDREN

Mr Johnston has asked for just over £9 million for Scottish education in 1943, an increase of nearly £200,000 on last year. He proposes to spend more than half of this extra money on school meals and milk and he was able to give the House of Commons a good account of his stewardship for the past year. Since July 1941 school dinners had increased from 35,000 to about 110,000 in June 1943, though this still only means that 16% of Scottish children are getting dinners. The distribution of school milk was better and 67% of the school population were getting it Owing to the war the usual routine examination of school children has lapsed but what examinations have been made show no deterioration in nutrition For example, about a third of the school children of Lanark were examined—some 26,000—and only 42 were shown as suffering from bad nutrition. The Glasgow school health service report that in 1942 boys and girls of 13 were over 2 lb. heavier than boys and girls of that age in the five years before the war What Mr. Johnston described as Plantagenet afflictions unfortunately still flourish and during 1942 in Glasgow over 13,000 new infestations of scabies in schools were detected But Glasgow's experiment at 17 selected schools where senior women teachers had been put in charge of a campaign against body infestations had been an unqualified success.

MAINTENANCE ALLOWANCES FOR THE TUBERCULOUS

A circular (36A/1943) from the Department of Health says that local authorities will find it psychologically advantageous for the tuberculous patient to look to the same individual for advice and assistance on both the medical and financial aspects of his treatment. Arrangements for administration of the allowances should therefore be in the hands of the public health committee, so that the appropriate officer, normally the tuberculosis officer, can establish personal contact over the whole range of matters affecting the patient This does not mean that public assistance officers and others who are expert in assessment work should not be asked to help, but they should act under the direction of the public health committee In most areas the allowances scheme is already being administered by the public health committees, but in one or two areas—Stirling county is one—there has been an attempt to dissociate the medical aspects of tuberculosis relief from the assessment involved in the payment of allowances. It would clearly be a mistake to place the administration of

that spirit of conflict between committees charged with public health and with public assistance which is now happily dying away.

PREVENTION OF BLINDNESS

The department has also drawn the attention of local authorities to the survey of the causes of blindness made by Marshall and Seiler in south-west Scotland,
summarised in these
preliminary inquiry
that the experience
Scotland as a whole
of the powers given them by the Prevention and Treatment of Blindness (Scotland) Act of 1938, to review their

are provided for children with defective vision; authorities that have not made such arrangements are asked to do so, and also to arrange for care in country homes for children suffering from eye disease, such as phlyctenular or strumous cases, associated with general constitutional impairment. School medical records of adolescents may now be passed on to insurance practitioners, thus ensuring continuity of treatment
with eye defects The records are als
examining surgeons under the Factor
should prevent young pe

from getting into unsuitable employment; such youngsters can profit greatly from vocational guidance. The possibility of infectious diseases giving rise to serious eye trouble should also not be overlooked, and eye injuries should be assured early skilled attention. In iridocyclitis, which often has its origin in some focus of sepsis, it is important to provide not only for early ophthalmological examination but also for any medical, surgical or dental treatment required. Not much can be done to prevent the onset of cataract, glaucoma and the other degenerative conditions which lead to blindness in later life, but many of them can be alleviated by expert care—thus, Marshall and Seiler found that in more than half the blindness due to senile cataract there was still a possibility of restoring vision by operation. Authorities are asked to overhaul the resources of their area so that no-one shall suffer the tragedy of blindness for lack of expert advice and treatment.

NATURE OF ANTIGENS

AT the Royal Institute of Chemistry on June 16, Mr. W. T. J. Morgan, D SC, said that it is only in the last decade that the composition of the antigens which induce immunity to infections has begun to be determined. At first it was believed that the strict specificity of bacterial antigens depended largely on the chemical and physical differences between the bacterial proteins. This view was abandoned when it was shown that filtrates from virulent bacterial cultures contain a soluble specific polysaccharide substance and are free from intact protein. The polysaccharides found to be responsible for the characteristic specificity of each organism were, however, devoid of antigenicity or only weakly antigenic.

Until ten years ago all attempts to separate the somatic antigens from the bacterial cell had been unsuccessful, but a practical method was introduced by Boivin, who extracted gram-negative bacteria at 0° C. with 0·2 N trichloracetic acid (pH 1·0–2·0). The extract was apparently free from intact protein and was powerfully antigenic. At about the same time Raistrick and Topley found that by the action of trypsin on certain bacteria it was possible to bring the antigenic complex into solution. The digestion was carried out at pH 8·2–8·5 for several days at 37° C. Methods of isolation that depend on extraction of the bacteria with cold anhydrous organic solvents, such as diethyleneglycol, in which native proteins and many bacterial somatic substances are insoluble, have also been successfully employed.

Certain groups of bacteria possess antigens that are built up from similar types of molecules arranged together as polymolecular aggregates; examples of this similarity in structure are the "O" somatic antigens of *Bacterium typhosum* and *Bact. dysenteriæ* (Shiga). Each antigen is built up of a polysaccharide, specific for the organism and responsible for its characteristic serological reactions, and a polypeptide-like component (most probably a conjugated protein). Other components of the native antigenic complex, such as phospholipin, also occur, and further unidentified substances may be present. But in specific instances it has been shown that of all the components present in the native antigenic complex only two, the polysaccharide and protein, are essential for the manifestation of antigenicity. It seems probable, therefore, that a bacterial antigen as it exists in the intact bacterial cell is not a simple compound of rigid chemical composition but consists of a labile molecular aggregate possessing an essential component—such as a polysaccharide—of definite chemical structure and of fixed composition which determines the strict specificity of the antigen, together with other loosely bound constituents which endow the essential component with antigenic properties. Only part of these physically associated molecules are necessary for the manifestation of the specific antigenic properties, and certain of these constituents can be dissociated from the labile complex during the isolation and purification of the antigen without more than moderately reducing the antigenic capacity of the active material. More thorough physical disaggregation of the polymolecular complex into single types of molecules will lead to complete loss of antigenicity.

Considerable support for this conception of antigenic structure was obtained when it was observed that the isolated and undegraded specific polysaccharide component of the antigen could be re-combined with the conjugated protein component, under almost physiological conditions, to form an antigenic complex that would give rise to antibodies specific for the polysaccharide component of the newly formed complex. Neither component showed any specific antigenic properties when tested alone. Furthermore, the non-antigenic specific polysaccharide of one organism will form an antigenic complex when combined with the conjugated protein component derived from the corresponding somatic antigen of another organism belonging to an entirely different bacterial species. The nature of the bonds that hold the different types of molecules together as a polymolecular aggregate is unknown. Future work will decide whether the association of the various component molecules is due to "salt-like linkages," hydrogen bonds, van der Waal's forces or some as yet unknown mechanism. It can only be said that the forces concerned give rise to an aggregate stable enough to behave as an independent molecular species.

Further evidence in support of these ideas on antigenic structure is derived from the success with which certain non-antigenic polysaccharides of both vegetable and animal origin have been converted to full antigens by combination with the reactive bacterial conjugated protein mentioned above. The artificial antigens again give rise to immune body that reacts specifically with the polysaccharide component used to build the antigenic complex. Antibodies against the polysaccharides agar-agar, cherry gum and gum acacia have been described, and more recently immune sera capable of specifically agglutinating human red cells of group A, but not those of groups B and O, have been prepared by combining a naturally occurring but non-antigenic polysaccharide complex that possesses group A specificity with a bacterial somatic conjugated protein. These powerful anti-A sera will be useful in certain blood-group determinations and in the technique of differential agglutination.

Bacterial and tissue antigens which are largely polysaccharide in nature belong to a class of substances characterised as "large molecules." They display unusual properties and it will be necessary to develop new methods for handling them and new chemical conceptions to explain their nature and function.

MEDICINE AND THE LAW

The Spackman Case and "Due Inquiry"

THE House of Lords has reserved judgment in the Spackman case upon the appeal of the General Medical Council. It is assumed that the Lord Chancellor will deliver the opinion of the House before the end of the current sittings. Meanwhile, whatever guesses may be permitted to those who attended the hearing in the intimate and indeed almost conversational atmosphere of the building in which their lordships sit, comment mus be deferred. It will be recalled that a registered prac tioner was found by the Divorce Court to have committed adultery, and that the GMC, having evidence of the fact that the other party to the misconduct was the wife of one of his patients, considered the removal of his name from the Register for "infamous conduct in professional respect." The registered practitioner had by this time the advice of a different solicitor who thought that his case before the Divorce Court had mishandled and in particular that certain witnesses should have been called who were not in fact called. Before the GMC the practitioner sought to call these fresh witnesses. The GMC was advised by its legal assessor not to hear them, because, where trials a reviewed in the law-courts, it is unusual to allow the calling of witnesses who could have been, but were not called at the trial court. The GMC refused to them and proceeded to direct the removal of the nam The practitioner then asked the Divisional Court t interfere on the ground that the GMC had not made "due inquiry" prescribed by the Medical Act. Th judges, by two votes to one, upheld the GMC. Th Court of Appeal said that the Divisional Court wrong. And so the case came up to the House of Lor It is a pretty dilemma. On the one hand, if the must re-hear the evidence of adultery and any additio witnesses not called in the Divorce Court, the con

quences are inconvenient and may be ludicrous. In all future cases where doctors are found by the Divorce Court to have committed adultery with patients, a lay tribunal, not equipped with the power to summon witnesses or administer an oath, will be obliged to inquire *de novo* into the evidence of adultery even though a court of law, suffering no such defect of equipment, has already adjudicated upon the issue. On the other hand,
does not
al in the
GMC be
bility of
another
tribunal in proceedings in which different persons were parties and all the available evidence was not heard?

In England Now

A Running Commentary by Peripatetic Correspondents

THE harvest in Cyprus is as delightfully primitive as anything I've ever seen. I had to go 40 miles up into Karpas yesterday to look at some of the outlying village hospitals, and everywhere the fields were dotted with groups of peasant women in blue, heads all swathed in white mantilakia, cutting away madly at their wheat with the most ridiculously small sickles which are still called δρεπάνια. Sheaves are smaller than ours, but are done up with a wisp just the same and when dry are piled into long low mounds not a bit like our ricks. The fun really begins with the threshing. A threshing floor seems to be any flat roughly circular patch of ground and the dried corn is tossed on to it in a fairly thick layer. Then an aged man seats himself on a chair put on a little wooden sledge, the bottom of which is studded with nails and spikes of all descriptions. The sledge, weighted to taste with odd stones, is then yoked up to an ox or an [illegible] ly he drives round and round for hours [illegible] ars have been pounded out. I doubt if [illegible] has ever been described, but feel it must exist. When the threshing is finished, the mixed chaff, straw and grain are piled up into a thing looking like an enormous potato clamp and an old crone mounts guard over this until the winnowers are ready. They tackle the mound with heavy wooden forks which have a saw-toothed biting edge, and toss madly away till the air for yards round is thick with flying chaff. Finally the straw and the grain are collected from what is left. The exciting thing, which is what you would expect though in a ritual so unchanged as harvesting, is that almost all the words used are classical ones which have undergone only the slightest of changes—sickle, sheaf, rick, threshing-floor, δρεπάνι, δεμάτι, θημονιά, and ἀλῶνι. Oddly enough ἀνέμισμα for winnowing does not seem to be classical, though σταχυολογία for gleaning is just.

We are used to our learned words being Greek, but we are not accustomed to using masses of them all at once. You would be a little gravelled, for example, if I asked you offhand for a sentence containing acolyte, therapy and hebdomadal, but out here in saying something so everyday as "Carry on with the treatment for at least 6 weeks," you use them all. This is one reason why your jargon really does come alive in Greek-speaking countries. Obviously the commoner pathological conditions, which we have transliterated, are the same; no-one gets a kick out of calling pneumonia or enteritis πνευμονία or ἐντερίτις. But it is pleasing to be able to talk about dyspnœa or diarrhœa, or even icterus, with the assurance of being understood. Admittedly there are other words for them, but Hippocrates could certainly get across. It's when you come to the typical outpatient phrases like "It's me nerves doctor," "I've got no strength," "I can't raise my phlegm," "He etched up a worm last night," that things become really xciting. Νευριάζω is so much more pleasant than the irst. Ἔχω ἀδυναμία almost makes me sympathetic, and if asked for a δυναμωτικόν I nearly always prescribe ne. As for ἐξαιρῶ, which has now become ξερνῶ, who could fail to like it? Ἔμεσις and ἐμετοί are rather efined.

A curious point, and one which is noticeable in English oo, is that the older the word is the more it tends to be ooked down on. We don't puke or poop on horns or o daft, though Chaucer did two of them at any rate, and refined Cypriots (those who have survived an education) would wince a little at ξερνῶ and also at another good Homeric word I heard the other day, λαώννω, from ἀλάομαι, I imagine, to roll about, be distraught with pain. Some Homeric words are quite accepted though, and I think the most refined lady could have a σκουλῆκι (σκώληξ a worm) or use the word σήπομαι to be rotten, though I'm not quite certain. You can realise how verbally exciting outpatients are and how many more notes are taken about words than about cases! And the morning usually ends with "Would you give me my tobacco pouch nurse? It's in my exoteric pocket, and matches are in the esoteric one!"

* * *

At the back of the junk shop there was a large case of books and I made my way towards it like a homing pigeon. I had to wade through what looked like the lumber of centuries—broken chairs, sand-glasses, musical boxes, grandfather clocks, saddles and harness, a reaper's scythe. The ferocious looking old man who stood on guard gave me a look which I did not like, but left me to pick out the volumes, blow off the dust and turn over their leaves undisturbed. It was there that I made the bibliophilic find of my life. It was a small volume bound in a sort of golden calf, with fine but very opaque paper, and printed in an attractive variant of what we call the Pegasus type, with clear bold outlines and well-formed serifs. It seemed to be the product of a monomaniac with money to burn, or of some New Spelling Society. I opened it at random and read:

"But it woz the abolishun ov the *famili* that led too the fienal solyooshun ov nyoorosis. Edyookaeshun woz taeken over bi a skild band ov chield therapists. Children wer no longer pamperd and dominaeted, and groo intoo adults without the restless dezier too pamper and domnaet utherz. The individyooal spirit kaem intoo its oen. Grandmutherli guvernments. . . ."

Turning to the title-page I read "*A Ferst Priemer ov Siekiatri for Skoolz.* Bi Moran Jenner Haycraft. The Lahnset Ltd., 2043." I showed it to the old man and asked how much. He gave it a glance and snatched it out of my hand. "Hey, you can't have that!" he said, "That's an advance copy. Not out yet."

* * *

"Over there," said Thomas "on a fine day you can see Stoke Hill. Before the blackout the lights of Exeter used to twinkle along the top and glow in the sky. A bit to the right you could see Haldon if it wasn't for this rain. In the winter when the leaves are off the trees you can make out the Belvedere Tower on the top, and I bet if you had a telescope you could spot the grand-stand on the race-course; no races now, I am afraid. When it isn't misty like this you can see the two bumps of Hay Tor looking over Haldon, and some other bits of Dartmoor that I don't know the names of. That wooded hill over there to the left—you can't quite see it today—is Killerton, which the local MP has lately given to the nation. A girls' school from Sussex has it for the duration. Just up the road you can nearly make out the huge lime trees which they call The Bury. It must have been a very ancient burying-place, but the trees are said to have bee[illegible] the
restoration of Charles [illegible] as
long as that. At the [illegible] get
a bit of a mirage when [illegible] ad
was covered with bushes and puddles. Those are real puddles you see now." "Great Scot," I cried, "what is that over the wall?" "Raspberries," said Thomas, "what did you think they were?" "I was afraid they were a mirage," I said.

* * *

The famous American astronomer Miller once visited an old school friend who was now physician in charge of a private mental hospital. To please the distinguished guest, the doctor introduced him to one of his patients
ed he was God.
livine decrees—
The conversation was going smoothly over the weather when Miller ventured the question how it was possible that God could create this large world of ours within the short time of seven days. The patient's brief and sharp reply was: "God does not talk shop."

Parliament

ON THE FLOOR OF THE HOUSE

MEDICUS M P

THERE have been two debates on War Pensions this week, one on the white-paper describing the amended Royal Warrant and another on the Pensions Appeal Tribunal Bill which passed through all its stages in the House of Commons. The changes in the Warrant open the door to many claims which might have been doubtful on the old wording or definitely outside the Warrant, for example, certain classes of accidents. The result will be to reduce the number of appeals to the tribunals when they start work in September.

The atmosphere had changed in comparison with the session about a fortnight ago when the Government had to withdraw the bill for the time. But although the House welcomed the new bill, which was introduced by Sir John Anderson, it examined and debated its details at length in committee. One change which will be helpful in the tribunal's work is that not only can the travelling expenses of appellants to tribunals be paid, but also fees for medical certificates or attendance of medical witnesses. The tribunals are still to retain their semi-formal character and a proposal to pay for "free legal aid" was resisted by the Government and by the House—among others by a solicitor MP who considered it would be undesirable to encourage the employment of paid legal aid. The Minister of Pensions announced that the British Legion had trained men to act as the appellants' friends and advisers in an unpaid capacity. An attempt to displace the medical member of the tribunal, made by an MP who is a lawyer, was resisted by the House and brought a tribute from the Minister to the good teamwork of lawyer, doctor and service man in the tribunals of the last war. The Minister also said that the present form of the tribunal was approved of by the British Legion and the TUC, and that they did not wish the status of the doctor changed.

So ends, for the time, a chapter of medical Parliamentary history which began in an agitation conducted by one or two doctors in the House supported by other members, and has ended with the setting up of tribunals after a drastic change had been achieved in the Royal Warrant. But it is not the last chapter of the story, because the debates have shown more and more clearly the case for the abolition of the Royal Warrant in its present form and the setting up of a system of all-in insurance covering any wound, injury, illness, or death occurring to a man or woman in the Services.

The House will be rising shortly for a summer recess but when it returns this matter will come up again, perhaps in relation to the application of a system of social security to the nation. The Government will publish a white-paper, probably in September, on the implementation of the Beveridge assumption of a unified and comprehensive medical service. And the House will also have before it plans for large-scale house building, and for the reform of education. The war is by no means over, but it is clear that we have arrived at a time when we must be ready if peace breaks out; and in the autumn there will certainly be consideration of the complex problems of relief and rehabilitation in Europe. UNRRA and AMGOT—United Nations Relief and Rehabilitation Administration and Allied Military Government of Occupied Territories—have already swum into our ken and other unfamiliar portmanteau words will follow. The milestones to the new age are always marked with strange combinations of consonants and vowels.

Another harbinger of what may be still a distant period of peace was seen in the debate in the Lords on scientific research. The DSIR, the MRC and the ARC all came in for review and many noble Lords stressed the importance of scientific research and some said we were behind other countries—notably the USA and the USSR.

The House remembers that we passed through parallel stages in the war of 1914–18, and we emerged to take part first in a boom, then in a slump, and to see our high aspirations destroyed by lack of foresight and political direction. The House fears a repetition of this story, and is planning well in advance to guard against the dangers which overcame us after the victory of 1918.

MIDWIVES' SALARIES AND UNIFORM

IN reply to a question by Miss RATHBONE on July 22 the MINISTER OF HEALTH said that he had received from Lord Rushcliffe the report of the Midwives Salaries Committee of which he was chairman, and the report was being presented as a command paper to the House, which would join him in offering congratulations on the committee's work. The new agreement, said Mr. Brown, will serve to encourage entrants into the profession and secure a more adequate remuneration for those already engaged in it. The total annual additional cost is likely to be at least £500,000. I am today, he went on, communicating with local authorities and the British Hospitals Association, commending to them the recommendations as to salaries, emoluments, and conditions of service. So far as domiciliary midwives are concerned, additional expenditure incurred by local supervising authorities will rank for the statutory grant available under the Midwives Act, 1936. As regards midwives engaged in institutional midwifery, the Government are prepared, pending the settlement of the post-war health services, to assist both local authorities and voluntary hospitals in giving effect to the committee's recommendations by making a grant equivalent to one half the additional expenditure. The committee have included a recommendation on a national uniform for midwives. The actual provision of such uniforms must be conditioned by the supply position, but, said Mr. Brown, as soon as practicable I shall submit to Parliament legislation empowering the Central Midwives Board to frame rules.

FROM THE PRESS GALLERY

Lord Dawson on Scientific Research

SPEAKING in the two-day debate in the House of Lords on July 20 on a motion by Viscount Samuel on the expansion of scientific research, Viscount DAWSON OF PENN reminded their Lordships of what nutrition has done for the war effort, and how, under Lord Woolton, a new era of knowledge and health had come into being. When peace returned there would, he felt sure, be a great surge forward of new methods and ways. In ten years there would be a transformation in our social life which it was difficult accurately to forecast today. This country must meet the new needs if it was to retain its economic and intellectual leadership, and an organisation would be needed to render available the store of talent which the war had disclosed. We had first, said Lord Dawson, to consider the universities and the larger technical colleges, because it fell to them to make contacts with the young minds and to train students in the scientific approach to problems. Then came private endowments, which added together were a great means of promoting research. This country was the happy possessor of three foundations which began as a politi experiment nearly thirty years ago—the Agricultur Research Council, the Medical Research Council, and th Department of Scientific and Industrial Research. Th bodies were under the Lord President of the Council a were amenable to Parliament, yet they had the f essential to their success. It was important where scienc was concerned—and this applied equally to —to prevent the enmeshment of any research body the close entanglement of a Government departm He hoped that these councils would be given a pro part in any scheme of research which the Govern thought fit to sponsor. In the collective minds of th Civil Service there was an imperfect appreciation understanding of what science stood for and he suggest that the higher posts in the service should be thro open to those who were trained in scientific research.

The Medical Research Council, at present under distinguished chairmanship of Lord Balfour of B outstripped the narrower boundaries of medicine a embraced the whole of the basic sciences on whi medicine was founded. In the course of the war it h had a range of activity which Lord Dawson thou would surprise many of their Lordships. It had wh time workers on its staff, and it had under its control great National Institute for Medical Research, wh large-scale work requiring investigation by teams carried on. The institute had a world-wide reputation and had played a leading part in advancing knowledge, notably in the fields of vitamins and hormones. The council also supported research in medical schools, in the universities and colleges. Its idea was to help the individual researcher who had proved his ability. Through its committees it coöperated with industry, notably with the Industrial Health Research Board, and a little while ago it founded a research professorship in industrial diseases at the London Hospital. The council was also an admirable intelligence department. It knew where all the workers on different subjects are, and it has the power to rally them for a common purpose.

Discussing the contribution of industry to research, Lord Dawson held that patent protection was wise and just provided the industrialist's profits were assessed with due regard to the public interest. Medicinal discoveries were specially protected. The actual discovery could not be patented, but only the method of its manufacture. After the industrialist had satisfied his expectation of return on his outlay, the new discovery was released for free evaluation and testing by the medical profession, who were at liberty to make any comments, favourable or hostile, without hindrance.

In conclusion Lord Dawson said the debate had made clear that there was no investment which offered better results to the nation than research. Ill health cost this country about £250 million a year. The progress of discovery diminished its ravages. Some diseases, like rickets and dental caries, were passing out of existence. Others, like diabetes, pernicious anæmia and deficiency disorders, were now under control. Since the discovery of the sulphonamides puerperal fever had steadily declined, pneumonia had lost a large part of its peril, certain forms of meningitis, previously incurable, were not infrequently cured, in gonorrhœa a cure could almost be guaranteed in three days and long-term complications almost entirely avoided. The isolation of pencillin from a mould was entirely to the credit of British minds. It was fair to say now that a great vista of hope opened in front of pencillin. What that vista was at present they could not be sure, because, by a wise provision, instead of the drug in its partly-developed stage being distributed far and wide for trial, it had been kept under strict control so that all the results of its testing were guaranteed as accurate. Thus greater progress would be made than if it were broadcast over the land too soon. The path of chemotherapy was opening [illegible]
[illegible] was helping in the
[illegible] wounds in the war.
[illegible] was a good natural
[illegible] only were precious lives saved, but health was improved and the quality of life enriched.

Lord CHERWELL, the Paymaster General, assured the House that it was the policy and intention of the Government to increase their assistance and encouragement to pure research. He would welcome any developments of industry in that direction. An inquiry was being held to make sure that the conditions of service, pay and prosperity of Government scientific employees compared favourably with those on the administrative side of Government work, so that, among other things, interchange might in suitable cases be made easier. He hoped that a definite announcement that these reforms were to be put into effect might be made before long.

Dehydration of Vegetables

The MINISTER OF FOOD announced in the House of Lords on July 21 that he was encouraging the dehydra-ion of vegetables in three forms—as cabbage, carrot and otato strips, as potato mash powder, and as potato flour (for human consumption) and potato slices (chiefly for nimal feed). A standard plant had been evolved and ach factory needed about 13,000 sq. ft. of floor space, 0,000 gallons of water and 12,000 lb. of steam per hour, nd facilities for disposal of the effluent which is bnoxious, particularly from cabbages. Lord Woolton oped to erect 30 plants, of which 22 had already been rdered, 3 were in operation, 11 under construction, and tes had been selected for at least a further 8. There as, however, little p [illegible]
lants being available [illegible]
would all be needed [illegible]

In the House of Lords on July 20 the Nurses (Scotland) Bill was read the third time and passed.

In the House of Commons on July 22 the Pensions Appeal Tribunals Bill passed through committee and was read the third time and passed. An amendment moved by Sir HENRY MORRIS-JONES was agreed to providing that medical members of the tribunals should be practitioners of not less than seven years' standing.

QUESTION TIME

Tuberculosis Allowances

Replying to Sir FRANCIS FREMANTLE, Mr. E. BROWN said that in 28 counties and 48 county boroughs the tuberculosis allowances authorised in memorandum 266/T are already in operation or will be in operation by the beginning of August, while the remaining authorities are at present completing the necessary administrative arrangements.

Reasons for Rejection of Recruits

Mr. T. H. HEWLETT asked the Minister of Labour whether, as examinees could not be told by medical boards the reasons for their rejection, he would consider allowing the medical board to inform the doctors customarily attending such examinees, should their identity be known.—Mr. MALCOLM MCCORQUODALE replied: The medical boards are already prepared to give information if approached by a man's own doctor.

Mental Instability

The instructions issued to medical boards provide for inquiry to be made into a man's personal and family history of nervous and mental illness, and for a specialist's opinion to be obtained in cases of doubt. Since October, 1940, every recruit has been asked to complete in writing a questionnaire, which includes two questions specially directed to this subject. Since December, 1940, the department has been notified by the Board of Control of all men who may have become liable for military service by reason of their discharge from orders under the Mental Deficiency Acts, and in all such cases the man's history is brought to the notice of the medical board. Men who exhibit indications of a high degree of nervous or mental instability, or who have at any period of their lives been certified to be of unsound mind, or about whom there is other convincing evidence of past or present insanity, are not called up for military service. [Mr. G. TOMLINSON replying to Mr. J. H. WOOTTON-DAVIES.]

Pre-Service Medical Records

Mr. S. S. SILVERMAN asked the Minister of Pensions why applicants for service pensions were required to furnish the Minister with a certificate from their panel doctor setting out their pre-service medical record for National Health Insurance purposes; who bore the expense of this investigation; and
[illegible] OMERSLEY
[illegible] ward of a
[illegible] question.
Where, however, an individual has notified his intention to refer his case to an appeal tribunal the information is invariably sought in order that the tribunal may have before it all evidence which may be relevant to the matter at issue. The information is also obtained in certain cases where the man asks the Ministry to review a refusal to award a pension and where the pre-service medical record may have a bearing either way on the claim. I do not propose to discontinue obtaining this information where it appears necessary for a fair determination of the points at issue. The man concerned is supplied with a form on which to obtain the necessary particulars, and unless a fee is required by his panel doctor should not normally be put to any expense in the matter.

Raw Milk for Children

Major YORK asked the Parliamentary Secretary to the
[illegible] low
[illegible] red
[illegible]—
Mr. W. MABANE replied: Yes, provided their existing retailer is able to supply TT or accredited milk, but not otherwise in scheduled areas.

Lord MORAN's name is associated with those of Mr. Justice Oliver and the Bishop of Reading in the Government appointment to inquire into the treatment of men under sentence in naval and military prisons and detention barracks.

Letters to the Editor

DRUG CONTROL OF MALARIA

SIR,—Hughes and Murgatroyd, in their interesting article of June 5 refer to our case of malignant tertian (MT) malaria which responded so rapidly to a large dose of mepacrine (0·6 g.), and say, "it is conceivable that either quinine gr. 5 t.d.s. or gr. 10 t.d.s. would have produced the same therapeutic end-result without any risk of toxicity." This cannot, of course, be denied, but we feel this is not of paramount importance. What is important is the fact that mepacrine is *at least* the equal of quinine, and that in view of the shortage of quinine, mepacrine can be given with confidence. Hughes and Murgatroyd infer that 0·1 g. of mepacrine equals gr. 10 of quinine. Our experience with the two drugs, using them to abort a primary attack, in no way agrees with this. We are inclined to the view that 0·6 g. of mepacrine is about the equivalent of gr. 15 of quinine, or at most gr. 20. Our case did not show a heavy infection of parasites in the peripheral blood film, but it would be misleading to lay too much stress on this, especially in MT infections. Patrick Manson, referring to MT infections, used to say, "What one sees in the peripheral circulation is only a reflection of the drama which is taking place in the internal organs." We always emphasise the importance of recognising growing trophozoites of MT in the peripheral blood, and, if found, carrying out immediate treatment. Also, that rigors in MT are rare and that when they do occur developing forms are often found. But this does not mean that where MT parasites are scanty treatment can be delayed or that the infection is a mild one.

Horton Emergency Hospital.

J. ELLIOT MURRAY.
P. G. SHUTE.

SIR,—In view of the importance of the subject, one welcomes the observations of Hughes and Murgatroyd in your issue of June 5; but perhaps some aspects are not given the consideration to which [illegible]

In West Africa I had parasites of [illegible] *ciparum* in my blood at every examination over a period of 15 months, whilst taking quinine in doses of grains 10–30 daily—the latter dose for as long as 28 days. After 18 months I had a course of mepacrine, my blood being positive on the first day and negative thereafter. Eight months have passed and I have had no relapse. I feel the following points deserve mention.

(1) *Dosage of mepacrine.*—I have tested the contention of Murray and Shute. Every case of malaria admitted to a military hospital during the past 6 months has been treated with mepacrine 0·6 g. on the first day followed by 0·3 g. daily, with the exception of two cases admitted with hæmoglobinuria as blackwater fever. In every case except one, parasites had disappeared from the blood by the end of 24 hours; temperature was normal and stayed normal; symptoms of backache, headache, nausea and dysentery had gone. In the one case in which parasites were still present, it was found that the drug had *not* been given as ordered. These cases represented *P. vivax* and *P. falciparum* infections from India, Ceylon, Madagascar and W. Africa. *P. vivax* had a supplementary course of pamaquin. No symptoms of toxicity have been noted, and all patients have expressed a preference for this treatment as opposed to quinine.

(2) *Quinine-fast parasites.*—Of several cases one is particularly clear. A week after admission, with quinine gr. 30 daily, the patient was still pyrexial, with positive blood-film. Tanret test positive throughout. A *P. falciparum* infection in W. Africa.

(3) *Mepacrine prophylaxis.*—James and Shute showed the value of this in 1934. One of the essential failures of prophylaxis, which has led to the adoption of the term "suppression," may be traced to the habit of commencing administration of the drug after arrival and not before. By that time many people are already infected; at one of our busiest ports passengers are often infected before disembarkation or while lying off in the anchorage preparatory to convoy elsewhere.

(4) Mepacrine tablets have been passed into the bedpan. Probably this was due to extra compression or special coating to withstand tropical conditions, but instructions must be given that the tablets should be crushed.

(5) In the differential diagnosis, when a laboratory is available, a blood-film for malaria parasites and a leucocyte count should be performed in all doubtful cases In a malarious area, fever with normal leucocyte count is almost certainly malaria, whilst fever with parasites and a raised leucocyte count commonly means that malaria is complicating some other disease such as appendicitis.

Home Forces.

KEITH THOMPSON.

PULMONARY TUBERCLE IN CHILDREN

SIR,—Dr. Marcia Hall has paid me the compliment of quoting my previous investigation into the sources of infection in childhood tuberculosis. In her article she alleges certain deficiencies in the tuberculosis administration in London, basing her conclusions on cases which are quoted in detail. One of these patients was well known to me before he developed pulmonary tuberculosis, and the facts are at variance from the story related by Dr. Hall. Of her case 2 (group I) she says:

> "The school medical officer had examined this boy clinically, with special care because of his family history, but on no occasion had he been radiographed. No note had been sent to the tuberculosis officer of the reception area. . . . The child himself had attended a tuberculosis dispensary in London."

In point of fact, this boy was first seen by me as a contact on March 10, 1933. Mantoux positive 1/1000. No positive evidence of tuberculous disease was found and he was kept under observation, with light treatment Home conditions and parental care were very unsatisfactory. His mother spent some time in a mental hospital before her death from tuberculosis and the father mental condition was such that his business went to rui and the economic position of the family sank. Further attempts to secure the boy's examination, as a contact were unavailing till, in 1936, I secured the help of th local inspector of the NSPCC, with the cooperation o the school divisional officer. As a result the boy wa examined again and an X ray of his chest was taken o Oct. 20, 1936. The film (still in my possession) revealed no evidence of pulmonary tuberculosis. The boy wa examined again twice in 1937. He gained weight and showed no positive evidence of disease. He was recommended for re-examination in May, 1938, but failed t attend. (This supervision was in addition to that of the school medical officer.)

It is a routine procedure in London for the tuberculo officer to inform the school medical officer of childre who are contacts of tuberculosis. Dr. Hall testifies t the value of this when she states that the school medic officer had examined this boy with special care because of his family history. The passage of such information to the school medical officer acts as a double check and allows for the reference back to the tuberculosis offic of a child at any time. It would seem, from the above and from inquiries made later, that this boy was in goo health when he left London.

I have myself recently demonstrated cases with wid spread lung lesions (of adult type) in patients who—ev three or four months previously—showed no radi graphical evidence of disease. If the lung infiltration this case had been present for as long as a year b discovery—which is doubtful—it would surely not ha been visible before his departure for Sussex.

It is surprising that no attempt was made to obtain previous history of contact examination. That he examined at the Bermondsey Dispensary was well kno to the medical staff at Cuckfield, for Dr. Sheldon quoting this case at a conference on maternity and ch welfare mentioned the borough from which he came a certainly left his audience with the impression that known case of infective pulmonary tuberculosis had be allowed to accompany a school evacuation party.

Dr. Hall advocates a follow-up of child contacts for least three months after the removal of the source infection. She will now appreciate that in this case t follow-up in fact was considerably longer, and that view of unsatisfactory conditions pressure had to be to secure further examinations at the dispensary. It my practice, as a routine, to follow up for a period of years if possible. In tuberculous families it is not al possible to secure full examination of parents and siblings. To extend supervision to nephews, nieces and cousins who may visit the patient (vide Dr. Hall's case 3) is surely beyond the bounds of reasonable expectation.

Attention is drawn to the fact that tuberculosis officers in the reception areas were not informed of children known to be contacts. I wonder if Dr. Hall realises that when the school parties were finally assembled on the railway platforms in London in September, 1939, even the teachers in charge did not know whither they were going. It was frankly impossible on that occasion for London tuberculosis officers to acquaint reception areas of contact children. It was as much as we could do to keep track of our known cases of tubercle, many of whom had been suddenly discharged home from various institutions and were, of their own volition, leaving London for various parts of the country. The subsequent rise of tuberculosis throughout England and Wales provided ample evidence of the spread of infection caused by this unfortunate dissemination of cases. It is to be hoped that, as a result, all have been impressed with the part played by infection in tuberculosis—in contrast to other factors such as nutrition and housing.

It is regrettable that members of the British Pædiatric Association should have utilised the Cuckfield incidents to direct adverse criticism on the work of tuberculosis officers in the Metropolis. It would appear that such criticism is largely based on false assumptions.

Bermondsey, S.E.1. **C. H. C. Toussaint.**

FERTILITY

Sir,—The views of Ogino and Knaus are based on alculations deriving from the date of onset of the next ucceeding menstrual flow; and this date cannot be calulated accurately. In your editorial (*Lancet*, April 24, , 520) you say: "During part of the menstrual ycle conception is extremely unlikely." You give no uthority for this assumption, and the part of the enstrual cycle is not stated. In view of my findings the following cases I think the words "less likely" ould have been more apt. About 700 pregnant omen were questioned. They were asked:

1. The dates of the first, and last, days of the last menrual flow before conception.
2. The date of coitus.
3. The average length of the menstrual cycle.

Evidence was accepted only from those who could ive a definite history of having had only a single coitus etween the last full menstrual flow and the time when examination I found that conception had taken place;

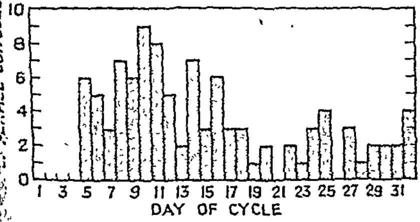

Fig. 1.

1 these made a group of 100. With the exception of they were questioned within 4–8 weeks of conception. st of them (95%) were wives of Service men, who ld give an accurate date for a single coitus while ir husbands were on leave. All had written records the date of the last menstrual flow. They were told to answer unless they could do so accurately and . intelligence were excluded. æ, 30 had had one previous , and 7 had had three.

The accompanying graphs show the results. Fig. 1 ompiled from the ent th of menstrual cycl % of the total) wh o women questioned . les for the most part, but they were asked "What is usual interval from the first day of one flow to the first day of the next.) Fig. 1 shows that, apart from the first four days of the cycle (during which there was no example of coitus followed by pregnancy), there were only two other days on which a fertile coitus did not take place (days 21 and 26). Neither of these can be regarded as a practical safe period because it is almost certain that in a larger series at least one fertile coitus would have occurred on one of these days. In fig. 2 there are only 3 days on which fertile coitus did not take place (days 21, 23 and 26) and the same objection holds here. It is evident, however, from fig. 1 that days 8–12 of the cycle constitute a more fertile period than any other group of days, the peak being on day 10. A lower peak on day 14 corresponds with what is known about ovulation. The peak in fig. 2 follows closely that in fig. 1.

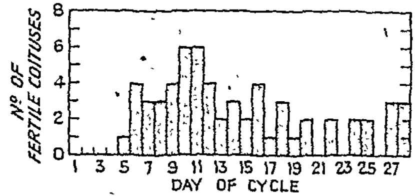

Fig. 2.

I wish to thank Dr. W. A. Bullough, county medical officer for Essex, for permission to undertake this study and to publish my findings.

Chingford. **Donald MacDonald.**

DICOUMARIN FOR THROMBOSIS

Sir,—In your leading article of May 15 you state: ". . . The object is to keep the prothrombin time—normally 11–12 sec.—between 35 and 60 sec.; the dosage suggested by Allen, Barker and Waugh is 300 mg. on the first day. . . ." The "normal" value of 11–12 sec. you quote is presumably based on Quick's method, *whereas the prolongation of the prothrombin time to* between 35 and 60 sec., as advocated by Allen, Barker and Waugh, has been determined using Magath's modification of Quick's method (*Amer. J. clin. Path. Tech. Suppl.* 1939, 3, 187). In this modification Magath employs, as his source of thrombokinase, rabbit brain tissue of lower activity than the tissue extract used by Quick, and the prothrombin times recorded with his test are correspondingly longer. Thus, the prothrombin time of normal human blood plasma as determined by the Magath method lies between 18 and 22 sec., and it is to this normal value that Allen, Barker and Waugh's prothrombin time of 35–60 sec. should be related, as indeed it is in the papers published by these American workers.

It seems important to lay emphasis on this difference; for were the above prolongation of the prothrombin time really based on Quick's method itself (as your lead- to a prothrombin rastic a depletion of the dicoumarin compound, might prove highly dangerous and certainly far exceeds the degree of hypoprothrombinæmia advocated by Allen *and his colleagues, or for that matter by* most other workers in this field. Generally speaking, doses have been favoured which depress the prothrombin to between 15% and 30% of its normal level.

C. W. Picard.
Welwyn Garden City. **D. E. Seymour.**

TREATMENT OF OSTEOCLASTOMA

Sir,—Few surgeons who have had experience in the treatment of giant cell tumours of bone will agree with Dr. Brailsford's assertion that irradiation is the treatment of choice in these difficult tumours. The five cases cited in his article certainly do not support his contention, as Mr. Capener and Mr. Griffiths have shown. They do, however, illustrate well the difficulty which is often experienced in arriving at a correct diagnosis.

Some years ago, I had an opportunity of studying a collection of some 60 giant cell tumours which had been treated by curettage and irradiation at the New York

Memorial Hospital. The late William B. Coley and Prof. Bradley L. Coley were responsible for the surgical treatment, Dr. R. E. Herendeen for the X-ray therapy, the pathologist was the late James Ewing. I mention these names in case the experience of the clinicians should be in question. From this review the following conclusions were drawn :

(1) Either curettage or irradiation will cure a number of giant cell tumours.

(2) The incidence of recurrences following curettage, and of failure to respond to a dosage of irradiation which leaves the neighbouring joint undamaged, is about equal.

(3) Those tumours which recurred following curettage were all of the aggressive type—that is, the stroma was unusually cellular and " active " as compared with those tumours which did not recur. It seems likely that the tumours which did not respond to irradiation were also of this type.

The chief reason why curettage and not irradiation is the treatment of choice in these tumours is that it permits careful histological examination of *all parts* of the tumour. An experienced bone pathologist will usually recognise a malignant tumour which may present radiographical appearances almost identical with those of a benign giant cell tumour, and defy diagnosis by a radiologist of even Dr. Brailsford's experience. This is clearly shown in case 1 where the march of events proved beyond question that this was a primary malignant bone tumour. The surgeon also has the inestimable advantage of knowing if the tumour has aggressive characteristics. It is these tumours which occasionally undergo malignant metaplasia, and any recurrence should be treated by amputation.

Surgery Dept., Univ. of Glasgow. ROLAND BARNES.

KARL LANDSTEINER

SIR,—May I add to the notice of Dr. Landsteiner in your last issue ? I first met him in New York in 1922 : we joined the Rockefeller Institute at the same time, and met almost on the doorstep. We soon became friends as we both felt like small boys coming to a large public school and knowing no-one there. He had had a lean time in Vienna after the war and had gone to Holland, where he had a small post as an ordinary pathologist to a hospital. After his experiences in Europe he was overawed at the magnificent buildings and equipment of the Institute.

Shortly after our arrival Dr. Flexner asked me to go over a paper with Dr. Landsteiner which the latter had written in English. I used to go round to his flat to do this and met his wife and family. It was obvious at once that he had a keen original brain and a deep knowledge of his subject. He was a hard worker, and his experiments were carefully planned and ably carried out. He was rather shy and reserved and did not seek much the company of his American colleagues. In the evenings he read much, mostly the literature of his subject.

After I left the Institute I kept up a correspondence with him and when he came to this country for an honorary D SC we had an evening together in London on his way home—with lager beer and sausage sandwiches. He preferred that and said it reminded him of the happier days in Vienna. During our years of friendship he showed me many kindnesses and taught me much.

Southern Group Laboratory, S.E.13. J. E. McCARTNEY.

MILK

SIR,—In the references to this subject in your issue of July 17 nothing is said about the practical impossibility of pasteurising effectively milk which is initially unsatisfactory. By effective pasteurisation is meant the attainment of present accepted standards—namely, a total count of under 100,000 organisms per millilitre, a negative methylene-blue test and a phosphatase test of 2·5 or less Lovibond units. Prolonged observations made here show that this standard cannot be obtained with mechanically perfect plant if the raw milk is unsatisfactory. Generally speaking, the " holder " process is more successful than the " high temperature short time " process in dealing with the situation, but neither process is reliable when the bulked raw milk contains a high proportion of bacteriologically poor samples. It is claimed that pathogens are killed if the phosphatase test is passed, and it has been suggested that this test alone is sufficient. I do not know ; but I do know that *Bact. coli* frequently survives in appreciable numbers in samples of pasteurised milk passing the phosphatase test, and I should not care to speculate on the survival of accidental contaminants such as typhoid and the more resistant tubercle bacillus.

The Government's long-term milk policy is admirable in its way, but it does not meet the present situation, which is due to a serious shortage of the right kind of labour at every stage of milk production from cow to consumer. Even when good methods are practised on the farm—and there are plenty of good farms as well as bad ones—the farmer's efforts may be nullified by transport delays, churns returned unclean from depots, crude delivery methods, dirty bottles and other factors in the production chain. Now that there is no free choice of dairyman the Government must accept, and in fact has accepted, a greater measure of responsibility for the protection of the consumer, particularly children. A long-term policy, however excellent, is not enough; nor is pasteurisation the whole answer. The solution lies in the organisation of a sufficiency of the right kind of labour in the dairy trade, coupled with adequate supervision.

In the meantime, the public would be well advised to heat-treat the milk on the domestic front, while those of us who are responsible for milk in schools and nurseries must take the best steps we can to ensure its safety.

Exeter. G. F. B. PAGE.

VINEGAR FOR BURNS

SIR,—I should like to know if any other doctors hav tried using malt vinegar as a first-aid dressing for burn Having used it for many years on burns of every degre I find there is nothing to equal it. I have also had personal experience of its value. Of the effect c artificial wood vinegars I have no knowledge ; it may l that the esters from the malt or grain in malt vinegar play a part in softening the harshness of the acetic acid The remedy should be lavishly and quickly applied if this is done, blistering is prevented, possibly by process of dehydration. Pain too is immediatel relieved. Most malt vinegars contain some 4 to 4·5 of acetic acid, and this seems to be the ideal strength Vinegar is in universal use as a condiment and is generally kept in a place where one can find it, unlike th small quantity of " something in the first-aid box which can never be found when required.

London, N.W.1. KATHLEEN AYLWIN-GIBSON.

EVACUATION OF WOUNDED BY AIR

SIR,—As I believe the following was the first case of a wounded soldier being transported by aeroplane, it may interest your readers.

On the morning of Feb. 16, 1917, a column composed the 2nd battalion of the Imperial Camel Corps (most volunteers from yeomanry regiments) and a company of 3rd battalion I.C.C. (Australian) with sections of a batt machine guns, Royal Engineers, and ambulance, of wh I was the medical officer, left El Arish to attack Bir-el-Hassa the last Turkish post in Sinai, about midway between Arish and Neckl. We entered Hassana without a fight, t Turks surrendering on Feb. 18.

At 6 that afternoon I received a message to send out a wounded trooper, who was got in at 10 PM with an shattered by a Bedouin bullet—entrance wound in heel large exit wound on instep with shattered bones. This 3919 L/C W. MacGregor, 7th Company, 2nd Batt. I.C (formerly of the Scottish Horse) was dressed ; but in morning my thoughts were on the awful prospects of a days trek in a cacolet on a camel in hottish weather and a small ration of water for each person. I then decide approach the pilot (Capt. Dempsey) and observer (Cullen) of a biplane D.H.4 which had accompanied column, and they readily agreed that, if I could get him the observer's seat, the observer would wait till aeroplane came for him. The ankle was fixed up in an provised box-splint and we succeeded, with difficulty and releasing two struts of the plane, in placing him in the seat

He was airborne at 10.15 AM on Monday, Feb. 19, landed at an aerodrome at Kilo 143, where he was p on a hospital train for Mazar or Kantara (Lieut.-Col

McKenzie) and operated on that afternoon or evening The journey by air took less than 15 minutes, instead of 2½–3 days' trek overland. From Colonel H. Wade (of Edinburgh), consulting surgeon to the Desert Army, I understood that his leg had to be amputated for gas gangrene, but his life was saved.

The relief aeroplane dropped a message to my colonel—who was with the remainder of the brigade on a flank protecting movement—and next day I received a message from the brigadier general and my colonel, dropped by aeroplane, approving my action.

I have been told that photographs of the loading of this man into the aeroplane are in the Imperial War Museum, but I have never been able to verify this.

Nottingham. DOUGLAS J. MARR.

TEACHING OF MEDICAL STUDENTS

SIR,—It seems to me important that Professor Ryle's letter published in the *Times* of July 21 should be discussed in the medical press, because he is critical of the fact that "the majority of doctors have been compelled by circumstance to the belief that their first function is the treatment of disease or injury, and not the maintenance of or education for health." Medical students, he

ns belief.

e prevention of injury and

positive health, are worthy

objectives For more than half a century these objectives have been pursued by doctors aided by politicians, educationists, the Church, and many other statutory and

direction in the past, he should read Sir Wilson Jameson's Harveian Oration (*Lancet*, 1942, ii, 175) It is an impressive record of past achievement steadily gathering momentum at the present time

But though this road to El Dorado and positive health is so attractive, it is to my mind doubtful whether the present-day teachers of medicine should make it the first road along which to lead their students. Students should come to us clinical teachers well informed as to healthy structure and function, having learnt anatomy, physiology and normal psychology, in their preclinical years of study. It is our prime object to teach them to recognise and treat departures from health and the manifestations of disease. Medical students in their first clinical years must make these subjects their first and most engrossing interest. There will always be some illness and injury requiring professional knowledge and medical care There are many persons outside the ranks of the medical profession competent to provide for the prevention of disease and the promotion of health, but doctors alone have the requisite knowledge for the diagnosis and treatment of disease. I maintain that the acquirement of this knowledge should be the first objective of medical students.

I write this letter with an open mind on the subject, because I am one of many doctors who have written in

Mansfield Street, W 1. GEOFFREY EVANS.

DR. H. A. MITCHELL, medical director of the Evans Biological Institute, Runcorn, died in Liverpool on July 3 at the age of 52. Born in Canada, the son of a Presbyterian minister, he was proud of his country and its democratic traditions—indeed he believed that the British Empire would be rejuvenated if the seat of government were moved from London to Toronto. Mitchell graduated BA at the University of Toronto in 1914 and took his MD two years later. He came to this country with the Canadian Expeditionary Force during the last war and remained to specialise in immunology and pathology, later joining the staff at Runcorn. He was also honorary pathologist to the Warrington Infirmary. Dr. Mitchell leaves a wife and two daughters.

Notes and News

THE MUNICIPAL YEAR BOOK

LOCAL authorities, like almost all other civilians, have to do more and more with less and less, and their dwindling staffs need all the help they can get. In the yearbook for 1943 (*Municipal Journal* Pp. 1302. *42s*) they will find a competent and trustworthy colleague. The watchword of the Minister of Health's preface is housing, he acclaims the repair of damaged homes carried out by the local authorities as one of the finest achievements of the home front and asks for short term plans for the first year after the war. The review of the year picks out the high lights in legislation and current trends as they affect local government, and to judge by the section on public health it packs in a good deal of what is going on in our war time world The usual directory of corporations and councils forms the larger part of the book and provides information hard to get elsewhere.

PARATYPHOID ENDOCARDITIS

IN the *Revista médica de Chile* (1943, 72, 70) J M. F Comas, E. Gallardo and M. Ossandon describe the case of a woman aged 56, with a long history of gall stone dyspepsia and colic, who was admitted to hospital after a fortnight of fever, sweats and headache, with pain in the left side of the chest during the last two days She was apathetic and pale, temp 100 4° F, and pulse rate 100 At the base of the left lung the breath sounds were diminished and there were crepitations. The apex beat was not palpable, the heart sounds weak. The lower edge of the liver could be felt below the costal margin, but the spleen was not enlarged. She complained of pain when the right elbow joint was moved.

The serum agglutinated *Bact. paratyphosum B*, and later in the illness this organism was grown from the blood, and also from the urine and sputum. Radiography showed multiple

patient died a month after her

s included large, recent vegeta-

pid valve, multiple abscesses in both lungs, numerous petechial hæmorrhages in the skin and in various organs, embolic focal nephritis, chronic cholecystitis, cholelithiasis and cancer of the gall bladder

INTRAPERITONEAL RUPTURE OF LIVER ABSCESS

IN *Analecta Medica* (1942, 3, 59) G Alamilla and C D. Guerrero describe the case of a man aged 58 with a history of syphilis at the age of 17, typhoid at 20, dysentery at 22 and malaria at 27. For 11 years he had had a small, painless lump in the epigastrium which slowly increased to the size of a tangerine. For 3 years he had suffered from flatulent dyspepsia with anorexia for fats, and for the last 3 months there had been right sided upper abdominal pain (aggravated by movement), a dry cough and remittent fever. He was found to have an epigastric hernia, reduction of which caused intense pain in the right hypochondrium The liver dullness was enlarged, especially upwards, and at the base of the right lung the breath sounds were diminished The white-cell count was 14,200 (82% polymorphs), and *Entamœba histolytica* was found in the stools Before operation could be done he suddenly developed signs and symptoms of an acute abdominal condition, and strangulation of the hernia was diagnosed At operation no strangulation was found but the operator's finger entering the general peritoneal cavity released a gush of greenish pus coming from the foramen of Winslow A finger passed through the foramen entered an abscess cavity opening through Spiegel's lobe into the lesser peritoneal sac The patient recovered with drainage and treatment for severe postoperative shock. He was given sulphadiazine, 4 g a day for a few days, and emetine hydrochloride in large doses.

Royal College of Obstetricians and Gynæcologists

The quarterly meeting of the council was held on July 24, with Sir William Fletcher Shaw, the president, in the chair. Mr Eardley Holland was elected president to take office in October. The following officers were also elected vice-presidents, Prof William Gough, Prof Daniel Dougal, treasurer, Mr. J P. Hedley, secretary, Mr. G. F. Gibberd (Mr William Gilliatt was appointed deputy secretary in the absence of Mr. Gibberd on active service), librarian, Wing-Commander Frederick Roques, and curator of museum, Mr. Aleck Bourne

The following were elected to the membership. J. K. Baker, Johan Kruger and Katharine I. Liebart.

Medical Honours

The following awards have been made to medical officers for gallant and distinguished services:

DSO.—Lieut.-Colonel G. S. N. Hughes, LMSSA, IMS; Captain E. T. Gilbert, OBE, MB BELF., RAMC.

MC.—Captain B. P. Tully, MB, NUI, RAMC; Captain A. Quadir, MB, IMS; Captain R. Singh Sahi, MB, IMS; Captain H. D. Eddy, BM OXFD, RAMC; Captain R. E. Johnson, MBE, MB LEEDS, RAMC; Captain C. S. Smalley, MRCS, RAMC.

The MBE has been awarded to Dr. Margaret Henderson Thomson (née Hunter) of the Malay Medical Service.

Mrs. Thomson was wounded by a bomb splinter just before leaving Singapore, dive-bombed during the evacuation, picked up by a lifeboat and finally marooned on a foodless island with other injured women and children. In the lifeboat she rendered invaluable aid to the wounded. Noticing that the boat was badly under-manned, she took an oar herself, and, despite her own wound, pulled hard for four hours and did much to encourage and keep up the morale of the boat's company. For three days while marooned on Kebat island with no food and very little water, she continued to attend to wounded women and children. Later, on Senajang island, she took charge of over 50 wounded and tended them day and night, in spite of a serious shortage of medical supplies and with the crudest of surgical appliances. She also assisted greatly in the safe evacuation of the most urgent cases to Sinkep island hospital. But for her resolution many of these people would have died, and it was due to such sacrifice on her part that her wound turned septic and she followed her own patients to hospital. Later she displayed admirable courage throughout the difficult journey across Sumatra.

Mrs. Thomson graduated MB at the University of Edinburgh in 1926.

Medical Casualties

The following RAMC officers have been posted as wounded; Captain H. C. W. Baker, MRCS, and Lieut.-Colonel J. W. Orr; MC, MB BELF.

Beit Memorial Fellowships

Of the 25 present research fellows 16 are now seconded for whole-time war work, and at a recent meeting of the trustees the following elections were made, with permission for each fellow to be seconded at any time for war duties:

4TH YEAR FELLOWSHIPS

J. J. D. KING, PH D SHEFF., LDS. To continue his studies of dental caries and parodontal disease. At the nutritional laboratory of the Medical Research Council, London, N.W.7.

P. C. WILLIAMS, B SC, LONDON. To continue his studies of natural and synthetic œstrogens. At the Courtauld Institute of Biochemistry, Middlesex Hospital, London University.

JUNIOR FELLOWSHIPS

MARGERY E. M. CUTTING, B SC LOND. To study the physiological metabolism of organs in infancy. At the department of medicine, Cambridge University.

A. KLECZKOWSKI, MD CRACOW, PH D LOND. To study serological reactions in reference to size and shape of antigen and antibody particles. At the Rothamsted Experimental Station, Hertfordshire.

G. J. POPJAK, MD SZEGED. Experimental study of fatty and degenerative changes in the kidney. At St. Thomas's Hospital medical school, London University.

ETHEL G. TEECE, PH D BIRM. To study the chemical structure of gram-positive and negative micro-organisms and to develop antibacterial agents. At the department of chemistry, Birmingham University.

Conference on Speech Therapy

The remedial section of the Association of Teachers of Speech and Drama which is in process of reconstitution as the Association of Speech Therapists are holding a conference at BMA House on Aug. 5 and 6. Dr. C. Worster-Drought will read a paper on congenital auditory imperception and its relation to speech defects, and Dr. Helen Watson on relaxation. Further information may be had from the hon. conference secretary, 15, Clareveill Courts, London, S.W.7.

Support for Smoke Abatement

At the Liberal Party conference on July 15 the resolution on land and housing, asking that the Minister of Town and Country Planning should have adequate powers to make and enforce a national plan for necessary reforms, was amended without dissent to include "the progressive elimination of the smoke nuisance."

Queen's Institute of District Nursing

Last year the 4230 midwives of the institute, though 65 less than the previous year, attended over 89,000 confinements—an increase of over 1000 on 1941. The number of maternal deaths was 104, and the meternal mortality-rate 1·17 per 1000 total births.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.

Royal College of Physicians of Edinburgh

A quarterly meeting was held on July 20, with Dr. Charles McNeil, the president, in the chair. Dr. J. M. Mackintosh (Glasgow) was introduced and took his seat as a fellow. Dr. H. H. Corrigall (Isle of Man), Dr. Ian Murray (Glasgow), Dr. James Innes (Edinburgh), Dr. Harry Stalker (Edinburgh) and Dr. Alexander Brown (Edinburgh) were elected fellows.

Royal College of Surgeons of Edinburgh

At a meeting held on July 20, with Mr. J. W. Struthers, the president, in the chair, the following, having passed the requisite examinations, were admitted to the fellowship:

C. P. Allen, MB LPOOL; G. W. Baker, MB EDIN; D. T. H. Evans, MRCS; C. C. M. James, MRCS; Herman Lytton, MD BERLIN, LRCP; I. S. McGregor, MB GLASG; Alison K. Mitting MB LPOOL; James Reid, MB GLASG; T. R. Simpson, MB EDIN; G. F. F. Sinclair, MB EDIN; and Moses Weinlos, MD ALBERTA.

Messrs. BURROUGHS WELLCOME inform us that mesulphen, which we described (July 10, p. 46) as probably the best treatment for scabies but unobtainable during the war, is still supplied by them as 'Sudermo' Brand Mesulphen and in 'Sudermo' Brand Ointment.

Infectious Disease in England and Wales

WEEK ENDED JULY 17

Notifications.—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 2082; whooping-cough, 2110; diphtheria, 571; paratyphoid, 11; typhoid, 11; measles (excluding rubella), 3054; pneumonia (primary or influenzal), 457; puerperal pyrexia, 154; cerebrospinal fever, 51; poliomyelitis, 7; polio-encephalitis, 2; encephalitis lethargica, 1; dysentery, 160; ophthalmia neonatorum 89. No case of cholera, plague or typhus fever was notified during the week.

The number of civilian and service sick in the Infectious Hospital of the London County Council on July 14 was 1632. During the previous week the following cases were admitted: scarlet fever, 183; diphtheria, 48; measles 40; whooping-cough, 40.

Deaths.—In 126 great towns there were no deaths from measles or enteric fever, 1 (0) from scarlet fever, 7 (2) from whooping-cough, 8 (0) from diphtheria, 45 (10) from diarrhœa and enteritis under two years, and 4 (0) from influenza. The figures in parentheses are those for London itself.

The number of stillbirths notified during the week was 207 (corresponding to a rate of 34 per thousand total births), including 27 in London.

Births, Marriages and Deaths

BIRTHS

BOULTBEE.—On July 22, at Stradishall, Suffolk, the wife of I. H. Boultbee, IMS retd—a daughter.

BURNFORD.—On July 21, in London, the wife of Sur Lieutenant David Burnford, RNVR—a daughter.

DOW.—On July 9, in London, the wife of Dr. James D a daughter.

GREENE.—On July 19, in Oxford, the wife of Dr. Raymond Gree a son.

MACKIE.—On July 22, in Edinburgh, to Dr. Elspeth Macleod, of Mr. Frank Mackie—a son.

SPALDING.—On July 21, at Farnborough, Kent, the wife of J. E. Spalding, MB—a daughter.

STANNING.—On June 29, at Hordle, Hants, to Dr. Kathleen (née Gillett), wife of Paymaster Commander Stanning, RN—a

THEOPHILUS.—On July 12, the wife of Dr. Geoffrey Theophilu Sandon, Stafford—a son.

WHITTALL.—On July 18, in London, the wife of Captain G. Whittall, RAMC—a son.

WHITTY.—On July 16, at Oxford, to Dr. Margaret Whitty (Shrubsall), wife of Captain C. W. M. Whitty, RAMC—a son.

MARRIAGES

MONRO—ROBERTS.—On July 17, in London, Robert Step Monro, FRCS, to Gwendoline Ellen Roberts.

STANSFELD—CHAUNDLER.—On July 20, at Wisborough G James Maryons Stansfeld, captain RAMC, to Lucy Chaund QAIMNS (R).

DEATHS

CROSBY.—On May 2, at Havelock North, New Zealand, Henry Pascal Crosby, MRCS.

RUTHERFURD.—On July 20, at Great King Street, Andrew Rutherfurd, MB EDIN.

STIBBE.—On July 23, at Gerrards Cross, Edward Philip FRCS, aged 58.

STOKER.—On July 20, at Loughton, Fred Stoker, MB DURH., F FLS.

UNDERWOOD.—On June 26, at Banstead, Bernard Dowsett wood, MRCS, aged 41.

SHOCK-PRODUCING FACTOR(S) FROM STRIATED MUSCLE

I.—ISOLATION AND BIOLOGICAL PROPERTIES

H. N. GREEN, M A CAMB M D, M SC SHEFF,
PROFESSOR OF PATHOLOGY IN THE UNIVERSITY OF SHEFFIELD

IT would be impossible to review here the vast amount of work on experimental shock, even in the last decade, to much of which any worker in this field must be greatly indebted.

Three main theories have held sway: (1) exhaustion of the nervous system, (2) local fluid loss, (3) toxic factors from damaged tissue. This report is concerned with the last hypothesis which first attained prominence following [illegible] H. Dale and W. M. Bayliss [illegible] is never since, in spite of oppos[illegible] iderable support. Evidence is [illegible] ance can be extracted from [illegible] injection, produces some of the signs and symptoms of shock. It should be emphasised from the outset that it has still to be determined whether this substance is in any way responsible for the shock [illegible] m of tissue trauma.

[illegible] d cover a wide range, and [illegible] other workers have helped. [illegible] evant to the conclusions are omitted from this preliminary report. A confusing feature is the variability of animal response, and such figures as are given represent an approximation to the mean of different experiments.

The work started in an effort to reproduce the crush syndrome experimentally by the method, introduced by [illegible] ia, produced [illegible] to the upper [illegible] pigs and rab[illegible] of the search for the hypothetical muscle shock factor was justified.

The following observations in particular supported the hypothesis.

(1) After complete asphyxia of the rat hind limb for 7 hours, amputation within 2½ hours of release of the clamp might save all the animals. From 2½ hours onwards the survival-rates steadily fell, to reach zero, on the average, at 4 hours. At a time when amputation was unsuccessful, the calculated local fluid loss often appeared insufficient to cause death.

(2) Rat plasma, injected intravenously, did not significantly decrease the mortality-rate, even when given soon after release of the clamp and in repeated doses.

(3) The rapid recovery from sublethal periods of limb asphyxia contrasted greatly with the progressive deterioration always observed after a lethal period. Moreover, if the clamps [illegible] ort time (e.g., [illegible] be reapplied [illegible] e lethal time (e.g., 4 hours) in order to cause death. The rat could withstand repeated sublethal periods of asphyxia in both legs, totalling at least 12 hours over a 32-hour period. Apparently the destruction or removal of the factor(s) responsible for death was very rapid, and the results suggested that there was a lethal threshold level at its site of action which, once attained, led to irrecoverable systemic changes.

(4) A tolerance could be acquired to the effects of limb asphyxia, so that, for example, rats were "trained" to withstand asphyxia of both hind limbs for 7 hours (cf. lethal time of 3–4 hours in controls) by progressively increasing the asphyxial time at 3-day intervals.

(5) Complete anuria in the non-survivors; or, in the survivors, anuria followed by oliguria, sometimes with red cells, blood pigment, casts or albumin in the urine.

All these facts supported the concept of a toxic factor released from asphyxiated muscle, and observations (1) and (2) suggested that it did more than merely increase local fluid-loss into the tissues.

Search for a Toxic Factor

From this standpoint, attempts were made to obtain a muscle extract which, on intramuscular injection, would reproduce the syndrome produced by limb asphyxia. Preliminary experiments with intraperitoneal implantations of minced rat muscle, mixed with sulphathiazole, sulphonamide [illegible] following metho[illegible] success, though toxic effects were observed erratically.

(1) Saline extracts of rat muscle frozen with CO_2. Injections were made into normal rats and into rats in which the hind limbs had been clamped for a sublethal time, with the idea that the extract might contain a factor which could supplement or complement the hypothetical factor coming from the damaged muscle.

(2) Similar extracts from asphyxiated limbs before, and at various periods after, release of the pressure.

(3) Similar extracts from limbs which had been warmed or cooled during the period of asphyxia.

The time between death and extraction of the muscle was very variable, and the question arose whether the hypothetical shock factor was very labile and perhaps rapidly destroyed in the dying muscle. Acting on this hypothesis, rabbit muscle was minced into boiling saline immediately after removal. This crude extract was consistently more toxic than any previously used, though there was no obvious difference in those prepared from asphyxiated or from normal muscle. Nevertheless, the idea of an unstable toxic factor in muscle had received some support, and a search was made in the literature for any further clue. A possible link was found in two short papers by Dyckerhoff et al. (1930).

They sought to find whether Lenggenhager's (1935–37) contention was true, that the rapid lethal effect of a fresh rabbit muscle extract given intravenously in the rabbit was due to intravascular clotting produced by thrombin. Dyckerhoff found no thrombin in the extracts but large amounts of thrombokinase. The extract lost its lethal potency completely after 2 hours' standing, but not its thrombokinase, which increased. After removing the thrombokinase from fresh muscle with acetone, saline extracts still killed the rabbit on intravenous injection, but larger amounts were required; the original lethal potency was restored by adding thrombokinase in the form of old muscle extract. It was concluded that the lethal effect was due to two factors, "myotoxin" and thrombokinase which, in combination, produced collapse with extensive thrombosis. The muscle extract was purified by a two-stage alcoholic precipitation with the production of a water-soluble powder.

Apart from a description of the rapid lethal action in the rabbit, no biological observations were reported, possibly because the main object of the work had been achieved.

It was to be expected that the effect described by these workers was non-specific and closely related to that produced by the intravenous injection of many tissue extracts. Nevertheless, this demonstration of an unstable lethal substance in muscle suggested, in the light of our earlier findings, that such an extract might produ[illegible] th[illegible] ext[illegible] with the more purified fraction (Myc) named myotoxin by Dyckerhoff, or with modifications or still more advanced fractions of this (Bielschowsky and Green [illegible] Factor(s)].

CONSEQUENCES OF INJECTING MSF

Intravenous injection.—It was easy to confirm the rapid lethal effect on intravenous injections in the rabbit and also to demonstrate a similar acute effect, with alternating head-retraction and signs of central nervous irritability in mice and rats. Death is preceded by a period of profound dyspnœa, with stridor and deep forced inspiratory movements at long intervals, culminating in complete respiratory paralysis. A wide variation in the MLD was noted—in part correlated with age, for the young tolerated larger doses than the older animals. Another striking feature was the rapid recovery from a sublethal dose and the ability to withstand repeated sublethal doses at short intervals without causing any permanent harm. This effect resembled the tolerance of the animal to repeated non-lethal periods of limb asphyxia. Direct blood-pressure observations in the cat and rabbit revealed the presence of a powerful depressor substance whose properties will be considered presently.

Intramuscular injection.—Having confirmed the acute lethal effect, the intra-muscular route was next chosen to find whether the local changes produced would resemble those seen after hind-limb asphyxia. A remarkable similarity was observed. The condition seen in the rat after a lethal dose was briefly as follows:

The rat becomes less lively in a few minutes. There is increasing listlessness, loss of irritability, progressive weakness and rapid shallow respirations followed by marked slowing at a later stage. The thigh becomes progressively swollen. The body temperature falls rapidly and progressively, remaining very low until death. Hæmoconcentration quickly sets in and may increase until death. Towards the end the animal merges into a dead-alive state; the respirations are slow, irregular and laboured, and finally cease at a time when the greatly dilated heart is still beating slowly. Consciousness is not lost until death, and though the animal responds only sluggishly to any environmental or superficial stimuli, it shows a delayed but more pronounced reaction to deep painful stimuli, which is much more striking in the hind-limbs. The blood-pressure (using the ear-occlusion method) shows a gradual fall. Usually no urine is passed except possibly very shortly after the injection. Death occurs in from 2 to 36 hours, the survival period varying directly with the dose and with the particular muscle fraction used. It may be as late as 72 hours, but this late survival cannot be produced regularly, since a lethal dose usually kills within 24 hours, and if the dose is slightly less than lethal the recovery phase is well advanced by this time.

If the animal is killed when moribund, the most consistent findings are: the very low bleeding volume; the viscous dark purple unclotted blood in the heart and main vessels; and the advanced local œdema of the thigh muscles, often with a subcutaneous exudation of what appears to be clotted plasma spreading subcutaneously into the inguinal region and even into the abdominal wall. On section the bulging muscles exude serum, they show scattered pale areas suggesting early necrosis. There are effusions, sometimes very large, of clear, yellow or slightly milky unclotted fluid in the pleural and peritoneal cavities. The lungs are bulky, œdematous and much congested, often with small superficial hæmorrhages, and the right heart is grossly dilated. Other common findings are gross venous congestion in the liver and large veins, and dark digested blood in the small intestine and sometimes in the stomach. All the tissues, including the brain, appear more moist than usual. The kidneys are often slightly enlarged and œdematous and darker in colour; the bladder is empty.

The striking feature after sublethal doses is the rapid recovery, and even with doses closely approaching the lethal, all the more precise findings to be detailed have usually returned to within normal limits in 24 hours. The thigh, however, may not resume its normal girth until the 2nd or 3rd day.

Intraperitoneal injection.—Similar general effects are seen after intraperitoneal injection; the post-mortem findings are similar, except that the exudates are usually larger and sometimes enormous while the peritoneal exudate is often very turbid, partly because of polymorph exudation. The lethal dose is somewhat smaller by this route and distinctly higher by the *subcutaneous* route.

These findings, like many others, suggest that if the concentration of MSF in the blood does not reach a certain level, the changes leading to death are not initiated.

Histological changes.—In general the histological changes in the tissues, except perhaps the kidney, add little information to the gross findings. There are, however, many exceptions to this statement, and an extensive inquiry into the fine morphological changes is required. Meanwhile chief attention has been paid to the kidney.

TEST ANIMALS AND SOURCES OF MSF

MSF produced similar effects in all species tested—rat, mouse, guineapig, rabbit and cat. The effects appear the same in all species, but widely different doses are required to produce them. The rabbit and guineapig are much more susceptible than the mouse and rat, while the cat is the most resistant animal tested. Intraperitoneal injections in mice are chiefly used for routine MLD tests.

Active extracts have been made from the voluntary muscle of the rabbit, ox, guineapig, rat, cat and man: all have very similar biological properties. Ox muscle is at present being used for large-scale production.

The Depressor Factor

The finding of a powerful depressor factor in the muscle extract naturally led to its study in detail; for a fall in blood-pressure (BP) is assumed to be the most important criterion of traumatic shock, and is one of the few features common to all forms of experimental shock.

On injecting the extract intravenously into the anæsthetised cat or rabbit the fall, often preceded by a slight transitory rise, is precipitous and is accompanied by severe bradycardia. This stage is quickly followed by a rise nearly as rapid, covering roughly two-thirds of the fall, and the heart resumes its normal rate. The second stage of recovery is much slower and may be preceded by a slight secondary fall. The rise may proceed to a level somewhat above the starting-point and then slowly return. The effect is quantitative, and with a single large dose the BP can be maintained below normal for as long as 20 minutes, though it is the second stage of recovery which occupies much the larger part of the recovery phase. A fall of BP to a level of a few millimetres is obtained by a dose very much below the lethal, and any further increase in dose only prolongs the recovery phase. With a fatal dose the pressure never recovers, except sometimes for a slight temporary asphyxial rise. The heart-beat becomes slower and more feeble and ceases in 10–20 minute [illegible] usually stopped at the outset. If [illegible] is given before the heart is too feeble, the BP gradually rises, and it has been observed to return to normal and remain there for an hour without any return of spontaneous breathing. The effect in cat and rabbit is very similar, except that the second stage of recovery is longer in the rabbit.

The relations of this depressor factor to other known tissue depressor substances have been studied. It is not histamine, for it has a powerful effect on the rabbit; it is not destroyed by histaminase; it is insoluble in acetone and in 75% alcohol, and it is unstable in acid solution; moreover, striated muscle is a poor source of histamine. It is not acetylcholine, for it is not antagonised by atropine (apart from the bradycardia effect, which is) and its chemical properties are different. It is not kallikrein, for it is not destroyed by boiling; nor is it Gaddum's P factor, for it is not destroyed by boiling in alkaline solution.

Its biological properties strongly suggested adenylic acid or its derivatives. With the active adenine compounds it shares the following effects:

(1) A depressor action not antagonised by atropine.

(2) Dilatation of the peripheral blood-vessels, as indicated by a greatly increased outflow from the perfused cat hind limb.

(3) Leucocytic reaction in rabbit eye (Bennet & Drur 1931).

(4) Rapid inactivation by muscle and tissue extract and by blood.

Its effect on the guineapig heart, though not precis the same as those described for adenosine or adeny acid, was compatible with its being a related compou It was observed to stimulate peristalsis of the stoma and intestine in the intact animal, whereas most of adenine compounds inhibit it in vitro (Drury 19 Gillespie (1934) showed, however, that though aden triphosphate causes relaxation of the intestine in a stage of increased tone follows.

Detailed comparison with the effects of vari adenine compounds on the BP and heart, and conside tion of the rapid destruction of its depressor action a saline muscle extract and by blood, suggested identity with adenosine triphosphate. This subst has now been isolated in amounts sufficient to acco for almost the whole of the depressor activity of muscle product (Bielschowsky and Green 1943).

Are the Depressor and Shock Factors Distinct?

It was at first thought that the shock-like effect and the killing power of the muscle products given intraperitoneally ran counter to the idea that MSF was identical with one of the biologically active adenine compounds; for these do not appear to be lethal in a comparable dosage (Drury and Szent-Györgyi 1929). Comparative tests of the lethal potencies of substances containing MSF and of adenosine, yeast adenylic acid and cytidylic acid supported this view. Nevertheless, preliminary tests indicate the shock-producing and lethal potencies of adenosine triphosphate are largely, if not wholly, responsible for the described properties of MSF.

In the light of the last statement the problem of a possible distinction between the depressor factor and MSF does not appear very relevant; but it arose for the following reasons.

On the assumption that the depressor factor was an adenine compound the effect of treating the muscle product (Myo) with N HCl was tested. The depressor factor was destroyed partially after 10 minutes' boiling and completely after 30 minutes. (Similar treatment with N NaOH was without effect.) But the acid-treated material retained the larger part (roughly 65%) of its original lethal potency, and a substance having many of its biological properties—except the acute depressor action—could be precipitated from solution with methyl alcohol. Most of the animal responses (see table I) attributed to the action of the MSF were obtained with the [illegible]

[illegible] ng points. Though [illegible] tion by incubating [illegible], or with fresh whole blood or plasma, the lethal property was not diminished and *sometimes seemed to increase. The depressor factor could* be almost completely precipitated by treatment with acridine, but the lethal factor appeared to be divided fairly equally between precipitate and filtrate, and a combination of the two [illegible] a period of ischæmia the rates of disappearance of the depressor factor and MSF seemed to differ.

Not all these differences have been fully explained, but there are good reasons for thinking them more apparent than real. Recent observations support the following hypothesis. Adenosine triphosphate is the substance mainly responsible for all the described effects of the muscle products. While, however, the adenosine radicle is the depressor factor and responsible for the "myotoxin" effect—i.e., rapid death after intravenous injection—the pyrophosphate radicle is responsible for some, at any rate, of the more prolonged shock-like [illegible] by blood and by a saline tissue-extract is of course explained by their richness in the enzyme deaminase.

Effects on Function

HÆMOCONCENTRATION

The concentration of the blood seen *after injection of* ISF is, like all these responses, very variable. It is ever so great if the quantity of fluid injected is large; ut, apart from this, it may be absent altogether, very ransitory, or at any rate easily missed. In the rat iven a lethal dose, the blood hæmoglobin begins to rise a very short time and in 1–5 hours reaches a maximum, [illegible] rticularly when the [illegible] The figure reached [illegible]) in the rat (normal [illegible] 24 hours the hæmo- obin level has often returned to normal, or slightly low, when the animal was moribund. The average figure at death in one group of 21 rats dying within 24 hours was 118%. In a comparable group of rats dying from the effects of ischæmia of both hind limbs, the corresponding figure was 140%. After the latter treatment the rise in hæmoglobin is much more pronounced—up to 210% in the moribund stage. As in the former group, but not so frequently, the figures may drop to normal or subnormal levels before death. The lower figures in the MSF treated rats may be due, in part at least, to the injection of relatively large quantities of water in which the substance is dissolved. With either treatment, a progressive fall in hæmoglobin to well below the normal was observed in a high proportion of rats surviving over 24 hours; it continued over several days, and while figures between 70 and 90% were common, values down to 50% were seen. This is presumed, though not proved, to be an indication of hæmodilution.

Although very many hæmoglobin estimations have been made, their interpretation is complicated by variations in the quantity of fluid ingested. One [illegible] in the state produced by [illegible] limbs, absence of hæmo- [illegible] ny one determination— [illegible] nce of "shock" or that the animal will necessarily survive. On the other hand, figures above 150% usually indicate a fatal result.

FALL IN BODY TEMPERATURE

This is a striking and consistent finding. It begins almost immediately after the injection of MSF and the temperature may reach 30° C. (normal is 40° C.) within one hour. It tends to continue progressively downwards until death. A similar immediate effect is seen after the injection of saline, but the fall is in no way com*parable and lasts only a few hours.*

Rectal temperatures as low as 22° C. have been observed in the living animal and temperatures of 25–30° C. may persist for several hours. Even with sublethal doses temperatures as low as 30° C. are recorded. The fall is a very sensitive index of the presence of MSF in the tissues, and it may prove to be a means of assay, though *the individual response is very variable. The fall is no* doubt associated with a profound lowering of the basal metabolism, but no precise determinations have yet been made.

[illegible] acridine precipitation) which do not show the intravenous depressor effect typical of the adenine compounds.

EFFECT ON RESPIRATION

After a lethal dose given intravenously, respiratory movements usually stop and may not start again. Often after a short period there are a few violent inspiratory gasps at irregular intervals before final cessation. With a non-lethal dose there is a short period of apnœa followed [illegible] minutes. [illegible] shallow [illegible] for an indefinite period in a rabbit given a continuous-drip perfusion with tolerated amounts of the muscle extract.

When MSF is injected into the rat by other routes there is a period of rapid respirations; but the rate gradually diminishes and may fall to around half the normal. Just before death the respirations are irregular and gasping and there is often stridor; when they cease the heart continues to beat slowly for some time. The lungs are usually œdematous, well expanded and sometimes emphysematous at autopsy. The nature of these effects has not been studied in detail (after vagal section for example). They are probably all due to asphyxia of the respiratory centre, though bronchial spasm may play a part. There is also other evidence of asphyxia of the central nervous system in rats after treatment with MSF. Signs of cerebral irritation, in the form of violent convulsive movements of different parts of the body at irregular intervals, are sometimes seen in the moribund stage.

EFFECT ON RENAL FUNCTION

It was early observed that a period of anuria f the injection, even when large amounts of flu injected at the same time. With a lethal dose this is absolute and the bladder is empty at death. With a sublethal dose the period of anuria may be very long—even up to 72 hours. This period may be followed by diuresis, and in roughly a quarter of the rats pathological changes in the urine were seen, such as albumin, granular casts, a positive benzidine test, occasionally red cells, and rarely frank hæmaturia. These changes closely resemble those seen after limb ischæmia, but except for the anuria which is more prolonged, they are not so severe. Their possible bearing on the "crush syndrome" and traumatic anuria in man, and the fact that the output of urine was easily recordable, and might therefore be used as a method of assay, led us to concentrate our attention on renal function.

The *blood non-protein nitrogen* (NPN) progressively rises in fatal cases, terminal values in the region of 100 mg. per 100 c.cm. (highest observed, 120) are usual. With sublethal doses the rise appears to be transitory, and figures only slightly above normal have been observed 18 hours after the injection, at a time when no urine had yet been passed. This increase in NPN is probably renal and not extrarenal in origin.

Output of urine.—Direct observations on the flow from the exteriorised ureter in the rabbit, after clamping the opposite renal vessels, have been made. After intravenous injection of a small dose of MSF, the flow of urine stops at once, and anuria persists for a period after the BP has returned to normal. This period varies with the amount injected and may be as long as 2 hours; diuretics usually have no immediate effect in overcoming the anuria. The same effect is also seen after destruction of the acute depressor factor by acid hydrolysis, and is therefore not a direct result of diminished glomerular filtration due to a low BP. In the cat anuria coincides with the fall in BP; but the cat is much less sensitive to MSF than is the rabbit.

Pressure in renal artery.—A few observations have been made on the pressure changes in the renal artery of the perfused isolated cat kidney. The effect is complicated, but even with minute doses the main evidence is of renal vasoconstriction. In one instance alternating vasoconstriction and dilatation, with an enormous range, began immediately after the injection and continued throughout the experiment. Oncometer observations on the intact kidney also suggest that vasoconstriction is the predominating effect. It is not yet known whether these reactions occur in the absence of the depressor factor.

Though there is little doubt that renal function is severely modified in the rat, definite evidence of structural changes in the kidney has been difficult to find.

At *autopsy* the kidneys appear darker than usual; they may be enlarged and œdematous. The inner cortical zone often seems more prominent, contrasting in its paleness with the outer zone. Estimations of the water content of a large number of pooled kidneys showed a definite increase (about 5%) over the control group. An almost exactly similar increase was seen in a comparable group of rats dying after limb ischæmia. A dehydration method was used; the results should therefore be confirmed by other methods.

Precise *histological evidence* of kidney damage has been hard to find. The rat kidney undergoes rapid autolysis, and even when it is removed from the healthy living animal direct into fixative, early changes in the cells of the convoluted tubules which would be interpreted as pathological, though presumably physiological, are seen.

Nevertheless, over a large series the definite impression is gained that changes in the lining cells of both the first and second convolutions—especially perhaps the second—are more advanced than in the control animals. These changes consist in loss of the brush border, and swelling, vacuolation and early necrosis or fragmentation of the cell. As would be expected, they also seem to become more obvious as the survival-time increases. Casts of various types, though not numerous, are often seen; they are mainly granular, sometimes cellular or hyaline, and rarely amorphous pigmented bodies. Changes in the glomeruli are irregular and usually absent or mild. Though definite changes have been seen in the capillaries, they are at present too erratic to warrant description.

Various subsidiary treatments designed to modify renal function and thus possibly give clearer histological evidence of renal damage, were undertaken—e.g., diminution of the fluid intake and administration of Na H_2PO_4. No significant results were obtained.

A greater measure of success was obtained by injection of *myohæmoglobin* * a short time before injecting MFS. This substance (tried only in amounts of 200–500 mg. per kg. body-weight) strongly reinforces the effect of MSF, so that only half, or even less, of the usual lethal dose is fatal. Given alone in the rat it has no obvious effect apart from the fact that oliguria and a rise in the blood NPN are observed. Combined with a dose of MSF insufficient in itself to produce anuria or affect the blood NPN, there is prolonged anuria and a large rise in the NPN (e.g., at 18 hours: MSF alone, 34·6; myohæmoglobin alone, 86·0; MSF + myohæmoglobin 186·1 mg. per 100 c.cm.). In the few kidneys examined, a striking dilatation of the second convoluted and other tubules together with large numbers of amorphous brownish-yellow casts (presumably myohæmoglobin) were seen. In the other groups there were no comparable changes except for a relatively small number of pigmented casts in the myohæmoglobin group.

Comparison of Effects of MSF and Limb Ischæmia

Some of the more important resemblances are summarised in table I. Some of the findings listed there, which have not already been discussed, must now be considered.

TABLE I—COMPARISON OF FINDINGS IN "SHOCK" INDUCED BY INJECTION OF MSF OR BY ISCHÆMIA OF BOTH HIND LIMBS

MSF	LIMB ISCHÆMIA
General signs and symptoms.	*Indistinguishable.*
Survival time proportional to dose.	Survival time proportional to duration of ischæmia.
Local œdema and exudation. Early and patchy muscle necrosis after intramuscular injection.	Similar but more obvious necrosis (at level of clamp).
General autopsy findings.	Similar. Noteworthy absence of gross lesion sufficient to account for death.
Delayed but then progressive fall in blood-pressure.	Gradual fall in blood-pressure remaining low until death.
Gradual fall in respiratory rate and increasing dyspnœa.	Later stages similar with slowing, dyspnœa and failure whilst heart still active.
Fall in body temperature.	Not seen until later stages but then progressive.
Hæmoconcentration often followed by hæmodilution.	Similar. Time relations comparable but final concentration often greater—sometimes extreme; possibly due to additional local fluid loss in inflammatory exudate produced by injury.
Renal dysfunction with rise in NPN, accentuated by myohæmoglobin. Structural changes in kidney slight but very evident in combination with myohæmoglobin.	Similar except that pathological changes in urine more frequent.
Rapid recovery from sublethal doses.	Rapid recovery from sublethal periods of ischæmia.
Acquired tolerance to increasing doses.	Increased tolerance to lon periods of ischæmia.
†Cumulative lethal effect of ½ MLD	+ ½ lethal ischæmic time.
†Tolerance much diminished after hæmorrhage or operative procedures.	Tolerance much diminished after hæmorrhage. Effect of other forms of tissue trauma known.
†Late deaths up to several weeks possibly due to lowered resistance to infection.	Similar.

† Indicates that tests were not made with material free from depressor factor.

One of the most important perhaps is the tolerance "immunity" which is developed to both trea Rats tolerate progressively larger doses of MSF give intraperitoneally at 3-day intervals, and they can "trained" to withstand a dose of 2 MLD and possib more. Technical difficulties arise with still larger do for the bulk of material involved is very high (Bi schowsky and Green 1943). Another difficulty is an creasing tendency to infection after repeated injectio this may be accidental, but there is some evidence the increased vascularity of the intestine and its s porting membranes may increase the permeability of gut to intestinal organisms. With purer specimens MSF this difficulty may be overcome. In compari with this acquired tolerance to MSF, rats also deve a tolerance to hind-limb ischæmia, and large have been "trained" to withstand twice the ischæmic time, which is about the practical limit the method used. Noble (1943) has clearly demonstrated a similar development of resistance in rats and guineapigs after a severe form of general body trauma. Here, too, there is a tendency to local infection of the thigh muscles, sometimes with a general spread. This is readily understood as the result of local trauma (though the skin is unbroken) combined with the longer survival times, though it may conceivably be caused in the same way as the infection sometimes observed after repeated doses of MSF.

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* A preparation kindly supplied by Dr. E. G. L. Bywaters

The crucial point in determining whether the two syndromes are related is whether a cross "immunity," in either or both

experiments on the

results of statistical

tolerance to limb ischæmia show a tendency to withstand somewhat larger doses of MSF, but no such tendency has been seen in the reverse experiment. If for argument it be allowed that the two syndromes are related, then the reason for the relative failure of the cross "immunity" experiment may be (1) that active substances other than those contained in MSF are released from the asphyxiated limb (e.g., myohæmoglobin); or (2) that the impure muscle extracts contain sensitising or toxic substances, other than those presumably liberated in the ischæmic limb. An interfering factor is the apparent lowering of resistance to infection produced by the repeated treatments. Animals tolerant to one treatment and then given the other sometimes die rom acute infection. A conclusive answer to these mportant questions may be obtained now that pure preparations of MSF are available.

f the clamps. If the dose of MSF approaches the ethal dose the effect may be very striking, for after elease of the clamps the animal may die in a few minutes. Vith roughly half "minimal lethal doses" of each treatment, the response of the rat is roughly similar, both n nature and, duration, to that seen after a "minimal ethal dose" of either treatment. The fact that the two nethods reinforce each other does not establish any elationship between them. For instance, rats submitted o a sublethal period of limb ischæmia show diminished olerance to histamine and to NaH_2PO_4 and to other gents (e.g., yeast adenylic acid and adenosine). Nevertheless, the fulminating effect described and the uantitative relationships of the combined treatments nay indicate some common feature in their modes of ction.

It has been frequently observed that rabbits and ats subjected to prolonged operative treatment under embutal anæsthesia tolerate much smaller intravenous doses of the muscle fractions. In the rabbit as

s for that reason that the renal changes and the early in body temperature are, perhaps, of greater significe than the other findings.

MSF IN ISCHÆMIC MUSCLE

trong support would be given to the present concept the finding of an increase in the amount of MSF limb muscle after a period of ischæmia. Various hods have been tried, but in none has any increase n found. Crude saline extracts (My_B) of the acetoned muscle from rat hind limbs, removed at intervals l—18 hours) after release of the pressure, were le. No very significant alteration in the MLD was d at any time, but its intravenous depressor effect ually diminished to a very low level. On the other l, in rabbit thigh muscle removed before release of the clamp and after 4 hours ischæmia, the percentage of active material (My_D) obtained by chemical fractionation (see Bielschowsky and Green 1943) was about half that from the control opposite limb (see table II). This might be expected since the muscle is dying during the asphyxial period, and it is well established that the amount of active material rapidly diminishes after death.

TABLE II—EFFECT OF LIMB ISCHÆMIA ON ACTIVITY OF MUSCLE EXTRACT (RABBIT) (Death—acetone time, 15 min.)

—	Calculated yield per g. ADM (mg.)	No. of depressor doses /g. ADM	No. of lethal doses/g. ADM
My_D : Control limb	11·0	11	0·6
My_D : Ischæmic limb *	0·2	6	0·3

tot

* Muscle removed before removing clamp.

Incidentally, it should be mentioned that anaerobic conditions do not prevent the destruction of MSF in the muscle after removal fror

that the process is not one of :

these findings at first sight sc

relationship between "ischæmic shock" and MSF, a possible explanation is given in the discussion.

Therapeutic Experiments

Following indications obtained from the published and unpublished results of other workers in the experimental treatment of traumatic shock, the following substances have been tested for possible prophylactic or curative actions, both after injection of MSF and after limb ischæmia. Given in the recommended doses, ascorbic acid (Ungar 1942), 'Nupercaine' (Ungar 1943), vitamin B_1, methylene-blue, and $NaHCO_3$ were without effect on the mortality-rates. Accurate survival times were not recorded.

Discussion

The full implication of these findings must await further elaboration and confirmation of the work. Whatever

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sarily a pathological state.

The immediate practical interest is whether the syndrome produced after injection is actually shock or a non-specific shock-like state such as may be caused by any general tissue poison. We are at once brought into the vicious circle of reasoning which is inevitable in a discussion of a state which cannot yet be accurately defined. In fact, the identity of the experimental syndromes is difficult to establish unless it can be shown (1) that MSF can be isolated from the blood or tissues of the shocked animal in significantly greater amounts than in any other morbid state or in the normal animal, or (2) that an effective method of prophylaxis or treatment by the production of "immunity" to shock with MSF, or by the destruction of MSF in the body, can be devised. Concerning (1), it is quite possible that even if the postulate is true, the results might be negative

have met with no definite success, but it is much too early to accept these results as conclusive.

Meanwhile one can only draw tentative conclusions by the process of analogy; and in doing this the failure of the histamine hypothesis, which at the time appeared extremely sound, should be borne in mind. Nevertheless, on the basis of any of the modern definitions of shock, it would be difficult to deny that the animals treated with the muscle product are in a comparable state. They show the cardinal features of a profound depression of all vital activities, with retention of consciousness almost till death, a low blood-volume, hæmoconcentration, a late fall in blood-pressure, a profound fall in body temperature and evidence of kidney damage. The post-mortem findings are relatively slight except for evidence of a widespread increase in capillary permeability. Less important but perhaps significant points are the increased peristalsis (with vomiting in the cat), the rapid, and usually complete, recovery from the state induced by a sublethal dose, the greater susceptibility of older animals, and the individual variability in response.

The whole syndrome is, moreover, strikingly similar to that seen when the circulation is returning to a hind limb in which the main blood-supply has been occluded for some hours. This latter method of producing shock is becoming recognised as a standard experimental procedure. It is very difficult to distinguish it, except for local hæmorrhage, from the state induced by more violent forms of trauma to the limb, and there is probably no fundamental difference between the two states. The effect of hæmorrhage may well be only that of increasing the degree of tissue asphyxia by reducing the amount of available hæmoglobin, or of decreasing the capacity of the tissues to destroy the shock factor(s). It may here be significant that bleeding the animal increased its sensitivity to both MSF and limb ischæmia.

Superficially it would seem that if MSF is responsible for some or all of the effects of muscle ischæmia, more of it should be obtained from the asphyxiated than from the normal limb; whereas in fact there is less, even when the muscle is removed before release of the circulation, and therefore presumably before any significant part could have been transferred to other parts of the body. It is, however, highly probable that the effect of the prolonged asphyxia is to increase the permeability of the muscle cells to normal intracellular constituents or metabolites. Viewed from this angle, the relevant fact would not be the quantity of MSF contained in the tissue as a whole, but its availability for resorption into the lymphatic or capillary circulation. That the amount is actually diminished corresponds with the fact that it rapidly disappears in dead muscle. It should be recognised also that in the living tissue its continuous production is possible, and that therefore in the asphyxiated limb, after release of the pressure, its formation may quickly begin again. It would continue to pass through the muscle cell membrane until the cell had recovered from the effects of the prolonged asphyxia.

In the rat a lethal dose of the crude muscle extract is roughly equivalent in terms of fresh muscle to one-fifth of the body-weight. This apparently enormous dosage is not, as might at first sight appear, outside the scale of any process likely to occur in the body. The bulk of muscle which must be submitted to trauma and/or asphyxiated in order to produce severe shock in animals or man is very large and the production of the hypothetical shock factor in the intact animal would not necessarily be static. On the other hand, in muscle dying after removal from the body the striking feature is the great lability of MSF, and a significant proportion has probably already been destroyed before the chemical extraction begins.

Duncan and Blalock (1942) showed that the survival time after hind-limb ischæmia was prolonged by the application of uniform pressure to the limb. This result may be explained by the control of local fluid loss; it can, of course, be just as well explained by the control of the rate of release of a chemical factor from the muscle into the general circulation.

It is still not clear how or where the muscle product acts. The degree of shock obviously depends on its concentration in the blood or tissues, for the survival time varies from a few minutes to a day or more, according to the dose and the site of its administration. The post-mortem findings, as in all forms of uncomplicated shock, only indicate a possible general increase in capillary permeability, and there is some evidence of an increase in the water content of the liver, kidney and brain (the only tissues examined). Vital dyes also pass more readily into the injected area and into the perfused knee-joint. All the phenomena described could conceivably be attributed to this one factor, though it must be noted that the more acute the effect the less ,us is the loss of fluid into the tissue spaces. The whole syndrome could just as well be attributed to a specific action on the nervous system, of which the capillary reactions are only an expression. In fact, the signs and symptoms are in the main similar to those produced by stimulation of the cholinergic nervous system.

All these points will be simpler to investigate now that the chemical nature of one, and possibly the only, active substance in the muscle extracts is known. Adenosine triphosphate is almost certainly responsible for the rapid lethal effect on intravenous injection, and is very probably responsible for the shock-like effects described as resulting from the injection of MSF. Experimental evidence for the latter hypothesis is not complete but the preliminary findings support it. Attempts are now being made to find whether adenosine triphosphate plays a part in the mechanism of shock produced by limb ischæmia and by other means. It is of interest that Bennet and Drury (1931) investigated the possibility of adenine compounds being released from injured tissue, and produced some tentative evidence of an increased release of such a compound from burned heart muscle. Assuming that it proves to be a factor in shock, it is unlikely to be the only one. Other physiological substances, which after release from the cell become potentially harmful, probably appear in the tissue fluids of asphyxiated tissue. Myohæmoglobin is an example, and this substance was shown to accentuate the effects produced by MSF. It remains to be seen whethe adenosine triphosphate or other muscle constituents, o a combination of these, are responsible for the shock o limb ischæmia.

It would be premature to try to identify these exper mental findings with those found in traumatic shock i man. There are, however, some common features whic may help in the understanding of some of the mo recent clinical observations. For instance, hæmocon centration has until lately been regarded [illegible] indication of shock. Recent clinical investigati fail to reveal it in the great majority of cases of seve injury, even when hæmorrhage is not considerable. I is by no means invariable, however, or at any rate ma be very transitory, in our experimental animals though here the factor of hæmorrhage does not ente Again, in this form of experimental shock the blood pressure may be maintained for many hours though oth signs of shock are present. Similar observations hav been recorded in man. Perhaps the most interesti resemblance concerns renal function. The anuria a urine changes following injection of MSF in the anima and the clinical syndrome of traumatic anuria, app very similar. Finally, the volume of muscle involv is undoubtedly related to the severity of traumat shock in man as it is in this experimental condition.

The "crush syndrome" has not been considered her though its experimental production was the goal initially aimed at. Our original hypothesis was that it was onl a more chronic form of traumatic shock in which, und the peculiar conditions, one manifestation, the r lesion, became more obvious, owing to the relat much longer time in which severe muscle asphyxia c tinued. Whether this hypothesis has any value or n there is little doubt that a disturbance of renal func is a prominent feature in shock produced by a var of methods. Bywaters et al. (1942) have demonstr the possibility that myohæmoglobin may be resp for the structural and functional changes in the "c kidney." The present finding that myohæmoglo accentuates the lethal and nephrotoxic potency MSF seems to have some bearing on this problem.

Summary

Some of the biological properties of a shock-pro substance extracted from fresh voluntary muscle described.

It is rapidly destroyed in the muscle after d which probably explains many previous failures to c shock-producing extracts from normal or injured mu

Given intravenously, it has a powerful depr action on the blood-pressure. With a lethal dose size of which varies in different species, the pressure fails to rise again and death rapidly en

Injected by other routes it produces a prolonged like state which, with an appropriate dose, proves

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* Of a team working in Sheffield.

sion of the circulation to the hind limbs. The physical signs and autopsy findings, and the pathological changes in the blood, body temperature and renal function are

ı by the muscle
ı. It is accentu-
myohæmoglobin.
the muscle shock
ɔ effects of hind-
limb ischæmia is also observed.

The conclusion is drawn that there are common features in the mechanisms of the shock-like states produced by the muscle shock factor and by hind-limb ischæmia.

Resemblances between the findings in these two forms of experimental shock and those in the traumatic shock of animals and man are also noted.

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I.—FRACTIONATION, CHEMICAL PROPERTIES AND EFFECTIVE DOSES

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THE method of preparation of the substance obtained om voluntary muscle, whose biological effects are escribed in the previous paper,[1] was based on that escribed by Dyckerhoff et al.[2] for producing "myo-oxin." The method, with our modifications, is as llows.

METHOD OF PREPARATION

Dried muscle—In the preliminary work the rabbit was used,

ıst be carried out with great speed, for only muscle brought o acetone within 10 minutes after death gives adequate lds of active material. The acetone is removed through slin or a very fine sieve and the muscle is stirred again into sh acetone (7 times original muscle weight). The acetone removed as before and the muscle stirred again into fresh tone (5 times the original muscle weight).

'he next stage can be proceeded with at leisure. The bulk
he aceto
ken with
material
ther. The muscle residue is spread out on filter paper in a layer and the ether allowed to evaporate off at room perature. The final drying is made in a vacuum desiccator CaCl$_2$: the dried material is then finely powdered, care g taken that no heat is produced during the process.

ude saline extract (*Mya*).—The dried muscle powder is ed in the refrigerator and used as required. In this form it appears to remain stable indefinitely. It is worked up into suitable batches according to requirements, the further procedure given is for an amount of 250 g This is mixed with 1250 ml. of saline and extracted for 7 minutes at room temperature on a shaker. The mixture is at once pressed through cloth of fine texture; the filtrate is brought quickly to boiling and after 7 minutes is quickly cooled to room temperature. The precipitate is removed by filtration (Whatman paper No. 54) and the filtrate (Mya), if required for biological tests, is Seitz-filtered.

Alcohol precipitate I (*Myb*).—The clear filtrate (Mya) is ice cooled and 3 volumes of ice-cold CH_3OH are added whilst stirring; it then remains in the cold for 2 hours. The precipitate is centrifuged down, the clear supernatants decanted and discarded. The precipitate is resuspended in the centrifuge tubes with CH_3OH (approximately twice the volume of precipitate). The washing is repeated and the precipitate given 2 washings with ether.

Instead of using the centrifuge to obtain the CH_3OH precipitate, it may be collected on a Buchner funnel (Whatman No. 50 smooth) and then washed twice with CH_3OH and twice with ether, taking care that the precipitate is always covered by fluid until the operation is completed. The resulting white cake, from either method, is quickly broken up and the ether evaporated off in a vacuum desiccator.

Alcohol precipitate II (*Myc*).—Batches of 5 g. of the precipitate (Myb) are placed in a mortar and dissolved in 250 ml. boiling saline, which is added in small portions, mixing well each time. The solution is transferred into a fairly large beaker (there is a danger of frothing) and boiled for 3 minutes. It is cooled quickly to room temperature and filtered (Whatman No. 5). To the clear filtrate 3 volumes of CH_3OH are added. The further treatment is similar to that described for Myb. The yield of Myc from rabbit or beef muscle is around 1% of the dry muscle. A further quantity, bringing the total yield up to 1·6–2·0% can be obtained by re-extracting the dried muscle residue with saline and pooling the two extracts.

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ent expression of part of the biological activity of preparations Mya, Myb, Myc and others to be described.

CHEMICAL PROPERTIES

Myc is a white amorphous non-hygroscopic powder. It is soluble in water, giving a clear solution, up to 10% at room temperature. In dilute HCl it dissolves more quickly, while in dilute NaOH it forms a very opalescent solution; it has no melting-point; discoloration starts at 195° C. and goes on to complete carbonisation. It can be reprecipitated from watery solution by the addition of three volumes of methyl alcohol or 4 volumes of acetone. It contains non-protein nitrogen. It gives a weakly positive reaction to all tests for protein (biuret, Esbach, Sakaguchi, Millon, Pauly, ninhydrin). The orcinol and Molisch tests are strongly positive; Fehling's test is negative; the Dische (desoxy sugar) test is negative. It contains traces of glycogen. It is rich in phosphorus, containing about 6% in the organic form, and contains magnesium but no potassium. The inorganic residue after incineration is on the average 30%.

In the dry state it retains its biological potency for an indefinite period. In neutral solution, in the cold, the depressor activity showed no alteration in 4 weeks; its potency in MSF was probably not altered but results were erratic.

RELATION OF YIELD TO TIME OF EXTRACTION

It was not always possible to get the whole of the muscle into acetone within 10 minutes of killing the animal. With the rat it was, and with the rabbit it usually was, but with the ox, killed in the abattoir, the time was usually longer. In table I a representative selection from the available data is made. It will be seen that the number of lethal doses per gramme dried muscle fell rapidly in both rabbit and ox muscle as the interval after death increased. Refrigeration did not prevent this, though it probably diminished the rate of loss. The LD_{50} of Myc from rabbit muscle appeared to remain fairly constant whether the yield was large or small; in contrast that of Myc from beef appeared to increase as the yield fell. This fall in the lethal dose was not directly proportional to the yield and is possibly an

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TABLE I—RELATION OF TIME BETWEEN DEATH OF ANIMAL AND IMMERSION OF WHOLE OF MUSCLE IN ACETONE, TO YIELD AND INTRAPERITONEAL LETHAL DOSE OF MUSCLE PREPARATIONS

Preparation	Time between death-acetone (min.)	Yield	Calculated yield	LD$_{50}$ /10 g. mouse mg.	No. lethal doses /g. ADM
		/g. ADM* mg.			
My$_a$ rabbit (av. figure)	10	3·5 ml.	5·0 ml.	1·8 ml.	2·8
My$_b$ rabbit (av. figure)	10	12·5	20·0	40	0·5
My$_c$ rabbit (av. figure)	10	10·0	16·0	17·5	0·9
My$_c$ rabbit control	20	6·2	8·4	30	0·3
My$_c$ (rabbit)	16 hrs. at 5° C.	2·1	2·6	30	0·1
My$_c$ (ox)	15	10·2	17·4	20	0·9
My$_c$ (ox)	60	7·7	12·2	80	0·15
My$_c$ (ox)	Overnight	2·1	3·6	60	0·06

* ADM = Acetone-dried muscle.

expression of the greater percentage of impurities in the beef preparations. These were made on a commercial scale and did in fact always contain varying amounts of insoluble matter which was not present in the rabbit material.

It should also be noted (see table III) that the crude preparation, My$_a$, from rat muscle gave the highest yield of lethal and depressor doses per gramme dried muscle of any preparation tested. This is probably due to the rapidity with which the whole of the rat muscle could be immersed in acetone.

LETHAL POTENCY OF VARIOUS FRACTIONS

In table II average figures are given for the LD$_{50}$ of My$_a$ and My$_c$ injected by the intravenous or intraperitoneal routes. The figures are only approximate, for both individual and strain variability are very great, while age, general condition and unknown factors affect the responses. They give however a working guide to the activity of the extracts when the prescribed methods of preparation are accurately followed.

It will be seen that the activity of the crude saline preparation, My$_a$, is roughly three times that of My$_c$. It was found that roughly two-thirds of the lethal and depressor potencies of My$_a$ remains in the filtrate after the first CH_3OH precipitation. Assuming that this activity is all due to unprecipitated My$_c$, the amount of My$_c$ in the dried muscle is some three times that of the calculated yield by this method.

The first CH_3OH precipitate, My$_b$, was considerably less lethal by the intraperitoneal route than the second precipitate, My$_c$ (tables I and III). This increase in potency from My$_b$ to My$_c$ is probably due to the removal of a substance which slows down the absorption of the active principle. This explanation is supported by the finding that they had an equivalent depressor activity on intravenous injection (tables I and III). There was a general tendency for the yield of lethal doses to increase progressively at the various stages of purification from My$_b$ onwards.

The intravenous lethal dose is very much less than the intraperitoneal lethal dose, ranging roughly from 1/5 to 1/15 in different species (cat excepted). It is probable, however, that this difference is not merely an expression of the relative blood concentrations attained, for the mechanism by which death is produced is probably not the same by the two routes of injection. Intravenously, death is due to a profound and sustained fall in blood-pressure, whereas a fall in BP is not the primary cause of death after injection by other routes.

As might be expected, large doses are well tolerated by mouth, and rats show little signs of being affected when an oral dose much larger than the lethal intraperitoneal dose is given.

SPECIES SENSITIVITY

Different species show wide differences in their tolerance to the extracts (table II).

The lethal doses for the mouse and rat are closely related and so are those for the rabbit and guineapig ; but the latter animals are much less resistant than the former. For instance, the intravenous lethal dose in the mouse is 10 times that in the guineapig, whereas the corresponding ratio for the peritoneal route is only 4. A similar type of relationship holds for the rabbit. This difference is again probably an expression of the difference in the mechanism of death after injection by the intravenous or other routes.

In both the rabbit and guineapig individual variability is pronounced.

Though the intravenous LD$_{50}$ of My$_c$ in the rabbit is given as 5 mg./100 g. body-weight one is occasionally surprised by seeing an apparently normal animal die in a minute or two, even after such a small dose as 0·25 mg./100 g. Some, but not all, of these "normal" animals proved to have a chronic lung infection at autopsy. On the other hand young rabbits have been observed to tolerate doses of 10 mg/100 g. without showing more than a transitory reaction. This extreme variability renders the rabbit quite unsuitable for biological assays.

The cat is the most tolerant animal of those tested. Owing to the large amount of material required, only a few tests of lethal potency were made on cats ; so the figures given are very approximate. The high intravenous dose, as compared with the rabbit, probab reflects the much greater stability of the cat's card vascular system. The enormous intraperitoneal dose, compared with the rabbit, may conceivably reflect t much greater tolerance of the cat to all forms of tiss trauma.

TABLE II.—LETHAL DOSES (LD$_{50}$) OF MUSCLE PREPARATIO IN VARIOUS SPECIES (PER 100 G. BODY-WEIGHT)

	My$_a$				My$_c$			
	Intravenous equiv.		Intra-peritoneal equiv.		Intravenous equiv.*		Intra-peritoneal equiv.*	
	Dose ml.	ADM g.	Dose ml.	ADM g.	Dose mg.	ADM g.	Dose mg.	AD g.
Cat ..	..	..	..	..	20†	1·25	600	3
Rat ..	3	0·6	18	3·6	20	1·25	175	11
Mouse ..	4	0·8	18	3·6	30	1·9	175	11
Rabbit ..	0·5	0·1	..	..	5	0·3	60	3
Guineapig	0·4	0·08	6	1·2	4	0·25	40	2

ADM = Acetone-dried muscle.
* Based on calculated yield of 1·6%. † During anæsthesia.

COMPARISON OF DEPRESSOR AND LETHAL POTENCIES

Table III shows a fairly close correlation, considering th two biological tests are involved, between the activ of the preparations in lowering the BP on intraveno injection and their lethal potency on intraperito injection. It will be observed however that the depressor to lethal dose is distinctly higher in the active than in the less active beef preparations. T observation is probably not of great significance, f may be merely an indication of the relative impurities with decreasing yields of My$_c$ from ox mus Some part of these impurities, though having no dep action, may have a non-specific toxic action which in a relative fall in the lethal as compared with depressor dose.

This lack of correlation, in some of the preparat tested, initially caused doubt as to the identity of depressor and lethal factors, and this was increased other observations,[1] particularly the results of acid lysis. While acid hydrolysis (see table III) destroyed the depressor activity, it only reduced lethal potency by about one-third. This suggested of identity between the depressor and lethal fa But results of further fractionation have in part these difficulties.

FURTHER FRACTIONATION OF MYc

The more elaborate chemical details will be pub elsewhere by one of us (M. B.). So only the outlines now be given.

Dialysis.—The dialysates of the various fractions already described were not consistent in their biological effects and will not therefore be considered further here.

[illegible] of a preparation which contains only a trace of protein; sulphosalicylic acid gives only slight turbidity and all the other protein reactions are negative. This product, My$_s$, is easily soluble in water and the reaction of the solution is neutral. Its ash content is, on the average, 25%. It retains the full biological activity of My$_c$. Its depressor activity is increased [illegible] increased [illegible] increase fr[illegible] rate of absorption after injection.

Precipitation with acridine.—From the early stages the biological tests had indicated that the depressor substance was probably an adenine compound. The results of chemical analysis also favoured this view; for adenine was isolated after acid hydrolysis, the pentose reaction was positive and the substance was rich in acid-soluble phosphorus. The confusion as to the identity of the depressor and MSF factors could only be resolved by removing the postulated adenine compound from My$_s$. This was attempted by precipitation with acridine. The acridine precipitate formed about 40% of My$_s$ and contained a high percentage of adenosine triphosphate; it possessed most of the depressor activity of My$_s$. The acridine-free filtrate had still a slight depressor action, whilst the lethal potency appeared to be fairly equally distributed between the two fractions. Precipitation of the filtrate with CH_3OH yielded a substance (36% of My$_s$) which had only a feeble depressor activity but about half the lethal activity of My$_s$.

Precipitation with barium chloride.—The precipitate (65% of My$_s$), freed from Ba, and allowing for possible losses in chemical manipulation, contained all the depressor and lethal activities of My$_s$ (table III). The Ba-free filtrate gave, on addition of CH_3OH, a small precipitate (about 4% of My$_s$) which had no depressor or lethal activity.

The barium precipitate was proved to contain a high percentage of adenosine triphosphate by analysis of its adenine content in the form of the picrate and by determinations of the 7 "mins." P. Reprecipitation with mercuric nitrate and barium acetate yielded a substance which analysis showed to be pure barium adenosine triphosphate. Preliminary tests with the sodium salt of this compound indicated that it possessed the full depressor and lethal potencies of the My$_c$ from which it was prepared (table III). Moreover the yields obtained (30–40% of My$_c$) appear to be directly related to the biological potency of the samples of My$_c$ from which they were prepared.

TABLE III—DEPRESSOR ACTIVITY OF MUSCLE PREPARATIONS ON BLOOD-PRESSURE OF CAT COMPARED WITH INTRAPERITONEAL LETHAL POTENCY IN MOUSE

Preparation	Dose producing fall of 30 mm. Hg/k. body-wt. ml.	No. depressor doses	No. lethal doses	Depressor/lethal-ratio
		g/ADM		
y$_a$ (rat) ..	0·02	250	5	50
y$_a$ (rabbit) ..	0·04	125	3·3	38
ox y$_a$	0·06	82	2·5	33
y$_b$	mg. 0·6	33	0·5	66
y$_c$	0·5	35	0·9	39
y$_c$	1·0	9	0·5	18
y$_c$	2·0	8	0·4	20
y$_c$	2·8	1·3	0·15	9
y$_c$ }	1·2	15	0·4	38
y$_s$ }	0·8	17	0·6	29
y$_c$	1·0	15	0·4	38
salt of Ba precipitate from My$_c$	0·4	11	0·3	37
y$_c$	0·5	20	0·5	40
adenosine triphosphate from My$_c$	0·3	23	0·7	33
enosine	0·6	.	..	..
Effect of Acid and Alkali Treatment on My$_c$ (N HCl and N NaOH, 30 min. at 100° C.)				
c	0·6	13	0·4	33
c (alkali-treated) ..	0·6	13	0·3	43
c (acid-treated) ..	5·0 +	0	0·25	0
OH precipitate ..	5·0 +	0	0·3	0

CONCLUSIONS

The results of chemical fractionation of saline extracts of the acetone-dried muscle strongly suggest that adenosine triphosphate is the substance mainly responsible for the described biological effects of the muscle extracts. It therefore probably corresponds to the muscle shock factor (MSF) described [illegible] remains to be proved, all [illegible] this view. It certainly is [illegible] and therefore responsible for the rapid lethal effect on intravenous injection in the rabbit. Inosine triphosphate has no significant depressor action. Adenosine triphosphate is identical therefore with myotoxin as described by Dyckerhoff.[3]

The fact, however, that acid hydrolysis for 30 minutes destroyed the depressor activity but only reduced the MSF activity, has still to be accounted for. This point has already been considered[1] in its biological aspects, but some chemical considerations are relevant. The toxic nature of the ash obtained by incineration provided a possible clue.

Tests with the ash at an early stage of the investigation suggested that its lethal potency was low and in any case of little importance since inorganic pyrophosphate, in itself poisonous, must be present in the ash of a substance so rich in phosphorus. Moreover, the pyrophosphate obviously did not exist in this form, at any rate in significant amounts, in living muscle. Neither did the fact that the lethal potency of the muscle so rapidly diminishes after death suggest that it was due to an inorganic salt. However, further consideration of this problem suggested that the insolubility of the ash might have been responsible for the indecisive assays of the lethal dose. Further tests with ash, made more soluble by acid treatment, showed that its lethal potency could be roughly related to that of the original substance. This relationship appeared to hold—a finding still unexplained and which needs further confirmation—even when the lethal activity of the parent substance was low.

These findings directed attention to the possible rôle of pyrophosphates in the shock-like state induced by the muscle extracts. With the isolation of adenosine triphosphate strong support was given to the hypothesis that the effects of MSF are in some degree—probably a large one—linked with the pyrophosphate radicle. If [illegible] produced by the muscle shock factor.

SUMMARY

The mode of preparation of a shock-producing substance present in striated muscle is described.

Evidence is given of its rapid destruction in the muscle after death of the animal.

The lethal and blood-pressure-lowering activities of the chemical fractions are stated, compared and discussed. The lethal dose in different species varies widely: it is [illegible] isolation of adenosine triphosphate in large amounts.

[illegible] conclusion that adenosine [illegible] of the features of the shock-like state which follows injection by other routes.

The expenses of this work were defrayed by the [illegible] Research Council. One of us (M. B.) receives [illegible] grant from this source. We are much indebted to [illegible] Broom and Mr. R. Falconer of Boots Pure [illegible] for their helpful collaboration in the [illegible] the muscle products.

SERIAL SPINAL ANALGESIA

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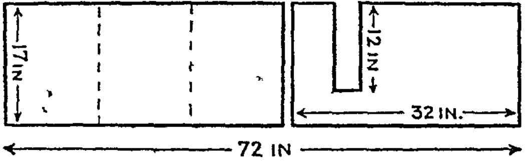
SPINAL analgesia has undergone many improvements since its discovery by Corning (1885), and its introduction into clinical medicine by Bier (1899). Modern interest was revived by the discovery of ephedrine by Chen and Schmidt (1926) and its use to combat the fall in blood-pressure during spinal analgesia by Ocherblad and Dillon (1927). Other drugs used in anæsthesia are given in continuous or serial dosage, according to the patient's needs, and it has always been held against subarachnoid block that the drug must be injected by the one-shot method. Thus Lemmon's first paper (1940) on continuous spinal anæsthesia was an important step forward. Later, Edwards and Hingson (1942) modified the technique for use in obstetrics as continuous caudal analgesia.

Lemmon used procaine ('Novocain') because of its lack of toxicity, the rapid onset of analgesia and the relatively short duration of action. Later Nicholson and his colleagues (1941) used amethocaine hydrochloride ('Pontocain'). 'Nupercaine' has also been used. Lemmon employed several strengths of procaine solution, all of them being greater than 3%. Fraser (1943) has recently published a series of cases using 1% procaine in saline, with which he is well pleased.

In this small series a start was made with procaine crystals dissolved in cerebrospinal fluid, but there was difficulty in getting the analgesia high enough for upper abdominal work; moreover, the preparation of the solution took too much time. Procaine, 5%, in normal saline was tried but was not as controllable as the final choice which has given considerable satisfaction. This is 5% procaine in 5% glucose, with a specific gravity of 1026, making it hyperbaric.

Equipment.—Serial spinal analgesia is made possible by placing the patient on a specially built mattress, 5 in. thick, which lies on the operating table, and has a cut-out part, 12 in. long, beneath the lumbar spine (see figure). The part beneath the buttocks, thighs and legs is detachable from the upper part supporting the head and trunk, and is in three sections which will flex towards the floor, thus allowing for the lithotomy and Trendelenburg positions. The lumbar-puncture needle remains projecting from the back and is connected with a syringe containing analgesic solution by means of 30 in. of thick-walled fine-bore rubber tubing. A tap near the syringe prevents CSF from flowing back into it, and can be turned on when additional doses are needed.



The Americans use a special lumbar-puncture needle made of German silver, which is flexible and will not snap, but owing to its softness this needle is difficult to introduce. Unhardened stainless steel Howard Jones needles (John Bell and Croyden) have been used instead and have caused no anxiety. On several occasions the needle has been found bent on withdrawal, but there have been no breakages.

TECHNIQUE

The premedicated patient with plugged ears and shaded eyes is given an injection to maintain the blood-pressure such as pholetone 10 mg., and is then placed in the left lateral position in such a way that the selected interspace corresponds with the gap in the mattress. A weal is raised and a Rowbotham's introducer is driven into the ligamentum nuchæ. The lumbar-puncture needle is then placed in the subarachnoid space through the introducer, which has three advantages: it prevents contamination of the needle by the skin edges; it provides splintage for the needle; and it fixes the needle by means of the screw cap at its distal end. It has the disadvantage that it masks the characteristic click felt when the needle pierces the dura.

The height of analgesia is controlled by the level at which the injection is given, by barbotage, by the rate of injection, by the tilt of the table and by the amount of drug injected. For upper abdominal work the second interspace is used, for mid-abdominal operations the third interspace, while for lower abdominal and perineal procedures the fourth interspace is selected. A rough estimate of dosage is to give 1 mg. of procaine for each lb. of body-weight, taking into consideration the build and general condition of the patient and the height of analgesia required.

When CSF runs freely, the needle is locked in position and the *initial* dose of procaine-glucose solution is injected direct from a syringe. This usually varies from 100 to 150 mg., or from 2 to 3 c.cm. The stilette is put back and the patient is turned into the supine position so that the protruding end of the needle lies in the gap in the mattress. This manœuvre requires care as clumsiness may result in the displacement of the point of the needle from the subarachnoid space. The patient should be told not to help himself round, but to lie as a dead weight to be lifted into the new position.

With the patient flat on his back the anæsthetist, who has kept his hands sterile, removes the stilette from the needle to see that CSF is dripping. Slight manipulation or rotation of the needle may be required to ensure a steady flow. The sterilised rubber tubing which has been filled with solution and emptied of air bubbles, and has one end attached to the solution containing syringe and tap, now has its other end plugged into the lumbar-puncture needle by means of an adapter. A bayonet fitting is ideal for this. Finally, the syringe is fixed t the head of the mattress with adhesive strapping. If on opening the tap, CSF can be aspirated into the syringe the technique is correct.

For lower abdominal operations the table remain level, while for upper abdominal procedures a 5 Trendelenburg tilt is required to send the solution to the proper level, and the head should be well flexed on a sandbag to prevent the solution from going higher than the fourth or fifth dorsal segment. Height of analgesia is tested frequently during the first ten minutes, and the table levelled off when it reaches to the nipple line. If in ten minutes the analgesia has not ascended high enough, a further dose of 50 mg. of procaine (1 c.cm. is injected. Fixation of the drug is complete withi ten minutes, and thereafter any position of the patie may be assumed without fear of further spread analgesia.

For operations likely to be short the syringe contain 5 c.cm. of solution, and for those expected to last ov 1½ hours, 10 c.cm. Additional doses of solution can be injected as required, and Lemmon suggests *that* each half-hour 30–50 mg. should be injected. The signs procaine insufficiency are discomfort shown by patient, together with dilatation of the previously tracted gut, and rigidity of the abdominal wall. should of course be the aim to forestall the appearan of these signs. In upper abdominal cases, the should again be placed in a slight Trendelenbur before supplementary injections are made; minutes are required for the effects of the fresh dr act on roots previously procainised.

It has not been my experience that withdrawal o after injection has shortened the period of anal Lemmon on the other hand, with his vastly gr experience, claims that withdrawal of CSF causes the effect to pass off. Should the circul collapse very shortly after either the initial or quent doses have been given, aspiration of fluid wou a rational procedure.

In most upper abdominal operations I prefer to the patient asleep, and light cyclopropane anæsthes which the atmosphere breathed has a high ox content, is the safest and most convenient wa assuring this. Alternatively, repeated small dos 'Pentothal' can be injected, while the patient is oxygen inhalations if and when they are required.

RESULTS

So far the method has been used in 105 cases, view of the newness of the technique the results been gratifying Below is a list of cases with the average doses required

Operation	*Cases*	*Average dose (mg)*
Acute appendicectomy	1	150
[illegible]	[illegible]	430
[illegible]	10	130
[illegible]	1	700
[illegible]	[illegible]	160
[illegible]	1	00
[illegible] ler	3	140
[illegible]	1	300
[illegible]	1	450
[illegible]	3	325
[illegible]	1	250
[illegible]	2	200
[illegible]	1	1 0
[illegible]		135
[illegible]	10	150
[illegible]	[illegible]	120
[illegible]	[illegible]	115
[illegible]		220
[illegible]	1	100
[illegible]	1	140
[illegible]	3	120
[illegible]	1	160
[illegible]	7	140
[illegible]	[illegible]	120

In several cases the surgeon needed the patient in a steep Trendelenburg position and in these additional doses of procaine were run in, a few milligrammes at a time to prevent the analgesia spreading too high

A young woman of 19 who was to have a chronic appendix removed failed to develop any analgesia after the injection of 150 mg of procaine As she was ill at ease and unhappy at not being put to sleep, cyclopropane was given and larger doses of procaine were not tried One patient in whom the technique of spinal puncture seemed perfect required 700 mg of procaine during 1½ hours to maintain adequate relaxation of his upper abdominal wound This was the largest dose given in the series Another patient, a robust soldier got indifferent relaxation in the muscles of his inguinal region after the injection of 250 mg In this case analgesia was adequate and the hernia was repaired without the need of further procaine A hypertensive female of large build was having an ovarian cyst removed The lumbar puncture resulted in a free flow of CSF and 100 mg of procaine was injected, towards the end of this injection the plunger of the syringe was slightly withdrawn and almost pure blood entered the syringe Analgesia and relaxation were both perfect and lasted throughout the operation but the blood clotted in the lumen of the needle, blocking it This patient complained of neither headache nor vomiting postoperatively

Blood pressure readings did not differ from similar readings using the one shot technique in operations on the lower abdomen, but in upper abdominal surgery e method makes it easier to maintain the blood [illegible] dosage of procaine is spread over [illegible] nstead of being given all at the [illegible] operative headache incidence has [illegible] either good or bad by the method Lemmon and Paschal (1942) report that they have ven over 1000 consecutive serial spinal anæsthetics d have only had to supplement one case with general æsthesia This is an excellent record which could be hieved only by the use of the technique described fully agree with them that with increasing experi- ce the total dosage of procaine used tends to go down No deaths have occurred in this series that could be any way ascribed to the method of anæsthesia

INDICATIONS

The method is more fussy than single injection sub achnoid block, but the difficulties are technical and are ercome with practice On the other hand there are vantages the small initial dose makes for safety, and e occasional patient who requires a larger dose than the erage is spared the unpleasant experience associated th failure of a single dose to act

When it is decided that a case is to be operated on ider spinal analgesia the serial technique is indicated ien the duration of operation is expected to be long or uncertain since the method makes it impossible for e effects of the drug to wear off before the surgeon has [illegible] the scope of [illegible] an operation [illegible] organs and a [illegible] algesia to the tenth dorsal segment is injected Discomfort results if parts of the stomach or omentum require to be subjected to traction, as in freeing of adhesions Extra procaine injected before this part of the proceeding will ensure the comfort of both patient and surgeon Lastly, in patients who are in poor condition, when a spinal analgesic is to be given, it is preferable to space the dose over the total time of operation rather than to give it all at once Moreover a minimum amount can be injected and later added to if necessary

CONCLUSION

Serial spinal analgesia is worthy of further trial in this country It gives flexibility and control more nearly approaching that experienced during the administration of general anæsthetic drugs Nosworthy's (1941) suggestion that when a new drug and a new technique are to be used together, one should first become familiar with the new drug used by old and well tried methods, is especially applicable to this method of spinal block

SUMMARY

The advantage of continuous spinal analgesia as introduced by Lemmon is that the drug can be given according to the patient's and the surgeon's needs

In a series of 105 cases reported here 5% procaine in 5% glucose was injected into the spinal theca in serial doses

The technique described requires a specially built mattress for the operating table with part cut out beneath the lumbar spine The lumbar puncture needle remains in the back throughout the operation and is connected to the syringe containing the analgesic drug by rubber tubing

A list of average doses for various operations is given

Results have been good

I would like to express my thanks to Mr Rodney Maingot and to Dr Rolf Strom Olsen for encouragement with this work

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DOGS AS A SOURCE OF LEPTOSPIRAL INFECTION IN MAN

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With the technical assistance of E VINCENT

ON the continent leptospirosis in dogs is of two types, one due to *L icterohæmorrhagiæ*, the other (Stuttgart disease) to *L canicola* (Schuffner 1934) In the United States of America the latter type is by far the commoner (Meyer et al 1939) In Great Britain, however, the only canine infection so far recognised is by *L ictero hæmorrhagiæ* (Okell et al 1925) The observation by Stuart (1938) of a serological reaction between *L canicola* and the serum of a human adult without either leptospirosis or special connexion with dogs does not go far to prove the existence of that microbe in this country

On the other hand, various pieces of evidence have come our way which strongly indicate that English dogs suffer infection with a leptospira serologically different from *L icterohæmorrhagiæ*, *L canicola* and other types known in Western Europe

In the course of experiments on leptospirosis of mice we exami [illegible] tests a number of leptospiral [illegible] e were advised by Professor [illegible] genic types hitherto known to occur in Western Europe (*L sejroe* was not then available) While a general confirmation of the accepted constitution of the group resulted from the tests, certain matters not covered by the continental classification came to our notice (see table)

Two strains—"McIntyre," given me by Major H. C. Brown, and *L. icterohæmorrhagiæ* (spaniel) No. 5260 of the national collection of type cultures—proved to be serologically distinct from the 4 known types that were tested, but identical with each other. On inquiring about the origin of "McIntyre," we learned from Major Brown that its host was a veterinary surgeon who had been working on leptospirosis in dogs, and particularly with a strain isolated from a dog. He became infected and the culture was isolated from him. These two strains, therefore, both presumably originated from dogs, and since they proved antigenically distinct from the continental *L. canicola* (of which two strains of diverse origin were used) we could only conclude that they represent a hitherto unrecognised British canine type.

Sera (rabbit)	Formolised serum-water suspensions					
	A	B	C	D	E	F
A *L. icterohæmorrhagiæ*, Jackson.	2500	100	100	0	0	..
B *L. canicola*, Roesch	320	1280	320	0	0	..
C *L. grippotyphosa*	200	80	1280	20	0	..
D *L. bataviæ* ..	80	200	50	5120	0	..
E *L.* 5260 (spaniel)	0	0	20	0	2500	..
F *L.* "*McIntyre*" ..	0	..	..	..	2000	2000

2500, &c. = end-point of agglutination at a dilution of 1 in 2500, &c. 0 = no agglutination at 1/20 and under.

NB.—Minor agglutination may be due to factors other than specific antibodies.

In an attempt to collect further information about human infection with this microbe we have tested with *L. icterohæmorrhagiæ* 5260 some 430 human sera sent for the agglutination test for Weil's disease, and in 1 case only have we seen a positive result.

Apart from his being a farmer, and therefore certainly associated with dogs, the history of the patient's infection was not obtainable. On the 6th day of his illness he was jaundiced, but his serum failed to give significant agglutination with any of the 6 types of leptospira tested—viz., *L. icterohæmorrhagiæ*, *L. canicola*, *L. sejroe*, *L. bataviæ*, *L. grippotyphosa*, and L. 5260 (British canine). A further sample taken on the 15th day, when the patient was reported to have fever, muscle pains, vomiting, leucocytosis and jaundice, gave agglutination with L. 5260 up to 1 in 80 and with *L. icterohæmorrhagiæ* at 1 in 20, the other strains not being agglutinated at all. A third blood sample 6 days later gave a positive reaction with L. 5260 and *L. "McIntyre"* up to 1 in 1280, and to *L. icterohæmorrhagiæ* at 1 in 80. The patient made a good recovery.

This, then, must be judged to have been an infection with the 5260 and McIntyre type of leptospira, so that we have now two recorded cases of this kind, the patient McIntyre himself being the first.

It should be noted that practically all the human sera sent for diagnosis were from already jaundiced patients, a principle of selection which must greatly reduce the probability of detecting non-icterogenic forms of leptospirosis. For it is well known that jaundice is rare in all leptospiral infections except Weil's disease, and even in that its frequency is less than 60% (Walch-Sorgdrager 1939).

To sum up, we believe that the facts presented go far to prove the existence of a hitherto unrecognised type of British canine leptospira, transmissible to man, and differing from the continental *L. canicola*. Owing to the difficulties of war conditions we have not excluded the possibility of its identity with other types of leptospira found in the East, but there does not seem to be any reason to expect this. It is hoped that other workers may obtain further evidence.

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SUDDEN SENESCENCE

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ON March 7, 1941, a man aged 40 was admitted to our emergency hospital suffering from severe depression and headaches.

He was happily married to his second wife, with two children by his first. He was an engine driver, who had suffered in the past from no serious disease. On May 8, 1940, when in perfect health, he slipped and fell from a stationary engine, probably falling on one hand, which he remembers drawing hurriedly aside to avoid a heap of hot cinders. He tried to rise but was unable to do so because "everything went hazy and he rolled over." He continued to "feel hazy," recovering full consciousness for short intervals only for some hours. On a stretcher on the way to the hospital he had a shivering attack. When his wife came to see him he wept copiously. For five days he complained of intense headache and for three days his movements were very slow and he could neither wash nor feed himself, and was too weak to sit up. He then began to improve, and at the end of six days was able to get up. As there was no history or sign of head injury and an X ray of his skull was normal, he was discharged on the eighth day. For three months he was unsteady in his gait. From the time of the accident he felt himself to be a feeble old man. He lost all sexual desire and power and was irritable and given to self-pity. His appetite became extremely bad and he suffered from insomnia, vague frontal headache, photophobia, and giddiness at the cinema and after the smallest amount of beer.

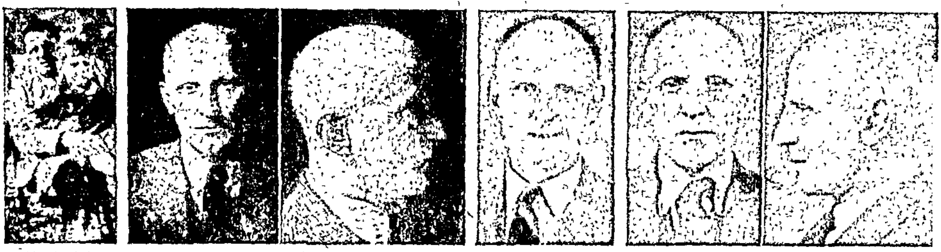
His scalp hair began to come out on the day of the accident at first in a round patch diagnosed as alopecia areata. The patch spread and by September or October, 1940, he was completely bald. He remained so until December, 1940, when a few white downy hairs appeared. Shortly before we saw him, a few dark hairs began to grow. In December, 1940 the hair of his limbs and trunk came out in patches and after a short time entirely disappeared. He had habitually shaved once and sometimes twice a day; but from the time of the accident he found it necessary only once a week. The axillary and pubic hair remained normal until after he came under our observation, when it gradually became sparse and grey.

On examination, he proved to be a man of very fine physique and powerful musculature. The skin of his body was smooth and fine but the face was wrinkled and old beyond his years. The blood-pressure was 148/90 mm. Hg. During his time in hospital the resting pulse-rate varied between 60 and 88 per min. and the temperature between 96·2° and 98·6° F. There was a soft systolic apical murmur. His abdominal reflexes were not elicited. His genitalia were normal.

His blood-count was: hæmoglobin 86%; erythrocytes 4 million; CI 1·07; leucocytes 9000, in normal proportion. The urine was normal in all respects. The resting blood-sugar was 78 mg. per 100 c.cm., and, in successive half hours after *50 grammes of glucose, 122, 139, 114, 90. Cutler, Power* and Wilder's test for adrenal cortical deficiency was within norm limits (urinary chloride 50 mg. per 100 c.cm.). The Wa mann reaction was negative. Cerebrospinal fluid was n X ray of the skull showed no abnormality. There was c plete achlorhydria. It was unfortunately impossible to e mate the 17-ketosteroid excretion or the basal metabolic rat

Psychological note (A. S. P.).—From the psychological po of view the most striking symptom was that when his h came out and he began to feel a feeble old man he bec depressed and full of self-pity. He felt unnatural in attitude towards his wife and also his son. He could feel natural affection and he realised that this was a sign illness. He went off his food and his weight went down fr 12 st. 13 lb. to 11 st. 9 lb. He also slept badly. There w however, no suicidal tendency. The battle of Britain beg three months after the onset of his illness and he was sively apprehensive, not relatively indifferent as one have expected. Whereas he had previously been a m smoker, he now smoked 40–50 cigarettes a day. He gave t impression of being a man with character and ability the average. He spoke in a quiet dispassionate way about illness and his future prospects. He was anxious to get b to work but doubted whether he was capable of driving engine. He appeared to be mildly depressed, but his m was quite consistent with his pitiable physical state.

SERIES OF PORTRAITS TO SHOW CHANGES FOLLOWING ACCIDENT IN MAY, 1940


March 1940 March 1941 March 1942 February 1943

siderations of compensation did not seem primarily to come into the case. He had served as a fireman for a long time and had recently achieved his ambition of becoming an engine driver. He had no very obvious domestic worries. His intellectual functions were unimpaired.

Progress.—During two months in hospital he improved considerably. He regained 6 lb. of his lost weight, and became more cheerful. There was a slight increase in scalp hair, but no change in other areas. In July, 1941, he reported that he was "getting along fairly well," but was still impotent. In September, 1942, he reported that the hair of his head was growing fairly well, but his eyelashes, eyebrows and body-hair less well. He still felt tired after exertion and was subject to occasional attacks of giddiness after eyestrain.

He was readmitted for further observation on Jan. 19, 1943. He appeared to have lost any neurasthenic aspect of his condition. He was sexually cold, but no longer impotent. He now had sparse black hair on the cranium, grey on the occiput and temples and on the pubes, chest and axillæ. There were no eyelashes or eyebrows. He shaved twice a week. His weight had remained steady. He got occasional headaches and attacks of giddiness, for which reason he had not returned to engine-driving.

DISCUSSION (R. G.)

My hair is grey, but not with years,
Nor grew it white
In a single night,
As men's have grown from sudden fears.

BYRON: *The Prisoner of Chillon.*

Hartley Coleridge records that the hair of Ludovico Sforza, the patron of Leonardo, became suddenly white from terror and Marie Antoinette's less rapidly from grief. The device has become one of the commonplaces of literature, which never, however, records whether alopecia totalis precedes the pigmentary change. That this omission may have been due to wilful suppression of an unromantic transitional phase is suggested by the frequency of the association in medical reports. Spiegler (1918), Stern (1922) and Pusey (1928) report alopecia and greying following emotional shock; Hurst (1940) mentions greying alone. In 1938, Thomson reported a case almost exactly similar to our own. After a very painful accident to his left hand, his patient lost all his hair (which afterwards grew white) and became wrinkled and old beyond his years. He lost weight and libido, and suffered from insomnia and headache. Investigations revealed a normal glucose-tolerance curve and a slightly low BMR. A fractional test-meal was refused. The blood-count showed 4,945,000 red cells per c.mm. and a hæmoglobin percentage of 88. Recovery was clearly taking place at the time of the report. Recently Allen and Carlyle-Gall (1942) reported a case in which almost total alopecia and loss of libido were associated with mental depression, but unfortunately the only laboratory investigations performed were an estimation of urinary androgens and the Wassermann reaction, both of which were normal. The suggestive point in their case was that the condition followed vaccination. Smith (1938) hac
alopecia (followed .

thalamus, though no positive evidence for this is available.

The points of similarity between these cases and Simmonds's disease need no stress. But Simmonds's disease is a condition of anterior panhypopituitarism in which all functions of the anterior pituitary are diminished or suppressed. In no record of sudden senescence can so complete a syndrome be recognised. Moreover, though loss of pubic hair is characteristic of Simmonds's disease, total alopecia is not. The parallel is closer with the remarkable series presented by Snapper, Groen, Hunter and Witts (1937). Their six cases all showed excessive fatigue, evidence of thyroid deficiency, hypogonadism, anæmia and hypochlorhydria (in five cases complete achlorhydria). All suffered some degree of alopecia, though it was total only in case 1. In case 2, the disorder followed postpartum hæmorrhage and is similar to the cases of Simmonds's disease following parturition reported by Sheehan (1937, 1939, 1940; Sheehan and Murdoch 1938a, b). In case 3 there was a chromophobe adenoma of the pituitary. Only in these two is pituitary damage relatively certain, and in these the scalp hair was not lost. Pubic and axillary hair were absent in all six. That in all six cases anterior pituitary deficiency was present may be accepted. It was proved by the effects of trophic extracts in cases 4, 5, and 6, and in cases 2 and 3 may be assumed for the reasons already given. In case 1, the clinical examination leaves no room for doubt. That the pituitary deficiency was primary except in cases 2 and 3 is less certain. The symptoms of Simmonds's disease may be seen in lesions of the hypothalamus (Leschke 1933), and a vast literature has accumulated on the control by the hypothalamus of the whole endocrine system. Endocrine symptoms and signs have been reported in hypothalamic damage due to increased intracranial pressure, internal hydrocephalus, trauma, tumour, vascular disease, syphilis, and, most frequently of all, encephalitis. In such cases, achylia gastrica and anæmia are common.

It seems therefore probable that the cause of sudden senescence s gland
than in the like to
the attacks violent
emotions of eculate
on the extent to which such cases may provide a clue to the changes of normal senility.

SUMMARY

A case is recorded of total alopecia associated with lassitude, impotence, anæmia and achlorhydria developing in a man of 30 after a fall. A comparison is made with Simmonds's disease and the "anterior pituitary" syndrome of Snapper and others. The suggestion is made that the cause of premature old age should be sought in the hypothalamus rather than in the pituitary gland.

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PURPURA OF THE SKIN

A REVIEW OF 500 CASES

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CLASSIFICATIONS of purpura have often appeared, but they have generally been based on a search of hospital records (and of published work) rather than on personal experience. The incidence of the various types of purpura has had meagre attention, and it is not always clear what an author means by purpura. I have therefore reviewed 500 consecutive purpuric patients in each of whom I saw skin-purpura with or without other hæmorrhages. Those who bruised on trivial injury were not included unless they also had spontaneous ecchymoses or petechiæ. Purpura has been sought and repeated bruises without knocks inquired for routinely in practically all my patients since 1938. Many interested patients have referred relations to me, some of whom proved to have purpura. The 500 cases are analysed in the accompanying table.

ANALYSIS OF *500* CASES OF SKIN PURPURA.

Group A.—183 cases (37%)		Cases
Purpura simplex ..		78
Schonlein's purpura ..	12	14
Henoch's purpura ..	2	
Hereditary familial purpura simplex ..		79
Hæmorrhagic diathesis (pseudo-hæmophilia)		
Non-familial ..	4	7
Familial	3	
Primary thrombocytopenic purpura ..		4
Hæmophilia		1

Group B.—Symptomatic purpuras, 317 cases (63%)		Cases
Physical		
(*a*) Cold	2	7
(*b*) Mechanical, Orthostatic .	1	
Traumatic ..	4	
Chemical		
Gold	4	5
Sulphapyridine ..	1	
Bacterial disease		
(*a*) Acute ..	23	41
(*b*) Subacute ..	7	
(*c*) Chronic ..	11	
Virus disease (measles)		1
Spirochætal:		
Syphilis	6	9
Weil's disease ..	3	
Parasitic (trichiniasis; Davis and Allott 1941)		2
Cachectic and terminal		32
Purpura senilis ..		67
Scurvy		5
Group B (continued)		
Metabolic		
Diabetes mellitus	1	2
Hæmachromatosis	1	
Endocrine		
(*a*) Cushing's syndrome	7	14
(*b*) Menstruation ..	1	
Puerperium ..	2	
Pregnancy ..	3	
Menopause ..	1	
Dermatological		
Urticaria	3	7
Erythema nodosum (cause not found)	1	
Exfoliative dermatitis	2	
Disseminated lupus erythematosus	1	
Alimentary		
Peptic ulcer ..	1	3
Chronic cholecystitis	1	
Ulcerative colitis ..	1	
Cardiovascular		
Cardiac	23	49
Arterial	20	
Venous	6	
Nephritis (chronic) ..		7
Rheumatic		
Fibrositis	9	47
Rheumatic fever	7	
Rheumatoid arthritis	21	
Osteo-arthritis ..	9	
Acute gout ..	1	
Hæmatological ..		18
Neoplastic (meningioma of the spinal cord)		1

Purpura simplex.—The 78 cases included 72 females. Another 24 patients gave a convincing history of this condition but as I did not personally see their purpura they were excluded from the series. Among the 12 sufferers from Schonlein's purpura were 11 females.

Hereditary familial purpura simplex (Davis 1939, 1941).—I saw 79 cases (including 75 females) in 46 families. There were 51 additional cases in these families in whom the purpura was not personally confirmed.

Mechanical.—In one patient the upright posture was the chief factor inducing petechiæ of the legs but in 10 others this posture aggravated purpura from other causes. I have reported one of the traumatic cases (Davis 1940).

Bacterial diseases.—(*a*) The acute cases comprised 11 of meningococcal meningitis, 3 of tonsillitis, 2 cases each of pneumonia, (dry) pleurisy, and *Bacillus coli* pyelitis, and 1 case each of osteomyelitis, bacteræmic endocarditis, and bronchitis. (*b*) The subacute cases included 4 of infective endocarditis and 3 of pyogenic abscess. (*c*) The chronic cases were 3 each of pulmonary tuberculosis and bronchitis, 2 each of sepsis and cystitis, and 1 of bronchiectasis.

Syphilis.—There were 3 meningovascular cases, 2 of aneurysm of aorta, and one tertiary.

Cachectic and terminal.—This group comprised those who were dying, usually from chronic disease, and purpura first appeared a few days or hours before death. There were 14 cases of cancer, 5 of senile bronchopneumonia, 5 of pulmonary tuberculosis, 4 of terminal congestive cardiac failure, 2 of uræmia and 1 case each of strangulated hernia and terminal meningovascular syphilis.

Scurvy.—Two cases were seen before the war, and 3 since (Davis 1942).

Cushing's syndrome.—Of 10 cases seen since this inquiry began 7 had skin-purpura.

Urticaria.—In 3 cases, purpura and urticaria were present together. One patient showed petechiæ at the periphery of the actual urticarial lesions.

Cardiovascular.—(*a*) Cardiac: 19 cases of congestive cardiac failure, 2 of left ventricular failure, and 1 each of angina pectoris and myocardial infarction. Of those with congestive heart-failure 7 showed gross purpura, 2 of these having the most extensive skin involvement of the series of 500. It was found that petechiæ and ecchymoses not uncommonly appeared over œdematous areas and not only in cardiac œdema.

(*b*) Arterial: 7 cases of cerebral thrombosis, 3 each of cerebral hæmorrhage, general arteriosclerosis, malignant hypertension and hypertensive encephalopathy; and 1 of high blood-pressure.

(*c*) Venous: 5 cases of varicose veins and 1 of thrombophlebitis.

Rheumatic diseases.—It was found that 8 of each of the 9 patients with fibrositis and osteo-arthritis were females, and that all my cases of purpura in rheumatic fever and rheumatoid arthritis were females. Of the 7 cases of rheumatic fever, in 4 the purpura accompanied the acute attack and in 3 purpura began within one year of onset of the disease (see Davis 1940).

Blood diseases.—These comprised 8 cases of addisonian anæmia, 4 of leukæmia, 2 of aplastic anæmic, and 1 case each of simple achlorhydric anæmia and hæmolytic disease of the newborn. There were also 2 cases of Hodgkin's disease.

Vitamin K.—Prothrombin estimations were not done in the series reported. Jaundice was seen in some of the patients with cancer, congestive cardiac failure and blood disease; while in addition to the patient listed with chronic cholecystitis and purpura, 9 others in this series had gall-bladder disease.

Capillary microscopy.—For some eighteen months I have examined the nail-bed capillaries of many patients with purpura. In purpura simplex it is not uncommon to see microscopic blood extravasations from these capillaries.

DISCUSSION

The degree of purpura in these cases varied from a few petechiæ to the involvement of the greater part of the skin. Ages ranged from a few hours to 89 years. In the rheumatic purpuras females were mostly affected, and purpura simplex (familial and non-familial) was overwhelmingly more common in women.

Förster (1878) reported 60 cases of purpura in 83,000 children and stated that Scheby-Buch found 174 cases in 100,000 patients in 41 years in Hamburg. Purpura in London is evidently far more common, for the 500 cases were seen in 50 months.

If it is true that vitamin P exists in citrus fruits and that this vitamin is essential for normal capillary resistance, an increase in purpura might be expected in current war-time conditions. So far I have not seen any increase.

Useful recent classifications of purpura have been given by Peck and his colleagues (1937), Forkner (1938), and (a remarkably comprehensive one) by Jürgens (1941). Haden and Schneider (1941) described 310 cases "studied completely" for hæmorrhagic disease. Perlman and Fox (1941), reviewing autopsy reports, found 355 cases with evidence of hæmorrhagic diathesis in 10,355 autopsies. Their information is of value, but it must be noted that these workers regarded as a hæmorrhagic diathesis any extravasation of blood through the endothelial walls of capillaries, external or internal, regardless of amount; and that cases of benign [illegible] rarely reach morbid anatomists.

Anaphylactoid purpura.—This conception has intrigued hæmatologists, many of whom include purpura simplex and Schönlein-Henoch purpura under this term. Yet in only a minority can an allergic cause of these purpuras be demonstrated as in Hampton's (1941) 2 cases There is as yet quite inadequate evidence for regarding most of these purpuras as allergic. Of my 78 cases of purpura simplex, in 8 there was a significant history of urticaria, in 8 others purpura began in the wake of an acute infection and 15 had suffered from rheumatic fever Of the 79 cases of hereditary familial purpura simplex 23 had had rheumatic fever. In my own series the rheumatic diathesis was more important than allergy (unless the rheumatic diathesis is itself regarded as allergic) and clearly there are other factors to consider To classify this group as a whole as anaphylactoid is unwarranted at present

Purpura and rheumatism —I have previously given evidence of a special association between purpura simplex and rheumatism (Davis 1941) It is well known that rheumatic features may be seen in patients with purpura, but it is insufficiently known that if purpura is sought for among the various "rheumatic" sufferers, it will be found fairly commonly, particularly among the women. This striking sex association (found also in purpura simplex) presumably has an endocrine basis

In any one patient multiple factors may contribute to purpura, e g, two or more of the following rheumatism,

purpuras were in a clear majority Benign purpura was very common, particularly purpura simplex (familial and non familial), and the serious purpuras were relatively rare Tidy (1920, 1937) was unnecessarily pessimistic when he stated that purpura should never be regarded lightly He considered purpura simplex and purpura hæmorrhagica to be grades of severity of the same condition but only rarely did any of my patients with purpura simplex develop serious hæmorrhages (Davis 1941) I have stressed (Davis 1939) some familial associations of hereditary purpura simplex (e g rheumatism, tuberculosis) but the prognosis in purpura simplex is almost invariably good. As regards symptomatic purpuras, a few crops of petechiæ in the course of an acute infection did not of itself affect the outcome, though the appearance of extensive purpura was often (but by no means always) of grave import In some of the most extensive purpuras seen, the patient recovered completely.

SUMMARY

A series of 500 consecutive cases of skin purpura is analysed.

Symptomatic purpuras formed 63% of the series

Benign purpuras were in a majority and serious purpuras rare

The connexion between purpura and rheumatism is stressed

There was no war time increase in purpura

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The work was done at St Stephen's and St Alfege's LCC hospitals with the support of the medical superintendents, Dr D S Sandiland and Dr B A Young and their staffs and the Rheumatic Unit Thanks are also due to Captain I Camrass, RAMC, Mrs A. Gordon Taylor, MRCP, Dr D Friedlander and Dr R Karpin

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EMERGENCY TREATMENT OF THE SMASHED-IN FACE

VALUE OF TRACHEOTOMY AND LARYNGOTOMY

DAVID H PATEY
M S LOND, F R C S,
SURGEON WITH CHARGE OF OUT PATIENTS AT MIDDLESEX HOSPITAL, AND SURGEON TO THE EMS

E W RICHES
MC, MS LOND, FRCS
SURGEON TO THE HOSPITAL AND TO THE EMS

THE smashed in face resulting from a severe blunt external force is emerging as a clinical entity With the motor car and aeroplane as common agents in its production it is essentially an injury of modern civilisation But it may also be produced in other ways Thus we have seen cases resulting from a fall down a flight of stone steps on to the face, in a cat burglar whose judgment on the security of the outside piping of the second storey was deficient, and in a workman engaged in digging up the road with a mechanical drill which flew back in his face We have also seen an example in an air raid casualty where severe injuries were caused by falling masonry, and our colleague, Major P. B Ascroft, met with cases in the Western Desert, again resulting from various types of blunt force rather than from missiles The increasing incidence of this and allied injuries and the problems arising in their treatment have led during the war to the establishment of special faciomaxillary units, and the results of the special studies in these units are now beginning to flow back to strengthen and enrich the main stream of surgical progress But in the stress which is rightly laid on the importance of the early transference of these cases to a faciomaxillary unit and in the illustration and description of the various technical methods which may there be employed, it has tended to be overlooked that they have also an emergency aspect which, if not satisfactorily solved, may prevent them ever reaching the special unit Having experienced the difficulties which are encountered in the immediate management of these cases we venture to give the conclusions to which we have come on their treatment by the emergency surgeon.

Taking a typical severe case, a patient having sustained a severe blunt injury to the face is admitted with the face swollen and distorted, and in parts depressed There are lacerations of the skin and superficial soft tissues, with perhaps some of the soft tissues torn back in the form of flaps The patient's face is covered with dirt and with blood, which is also both dripping out from the nose and mouth and running back into his pharynx, this makes him cough and splutter, and also interferes with the freedom of his airway, so that he may have difficulty with breathing and be cyanosed—which again tends to increase the amount of bleeding He may be unable to open his eyes owing to swelling of the eyelids Various bony injuries may be obvious to inspection the frontal sinus may be driven in, the nose crushed, the upper or lower jaws fractured, the alveolar margins distorted and teeth loosened or detached He may show general signs of shock and loss of blood

Kilner[1] has pointed out the importance in the first-aid treatment of these cases of turning the patient on to his side so that blood can run forwards and the respiratory embarrassment thus be prevented, and the Medical Manual of the American Army[2] also gives valuable first-aid hints On admission to an emergency surgical unit, the first st hæmorrhage
and a primary tissues and
fractured bones anæsthesia presents itself Intratracheal anæsthesia is the ideal, but the preliminary phase of inhalation anæsthesia through a facial mask is difficult not only because of the facial injuries but, more important still, because of the bloo
and
the
anæsthetised past the stage of the cough reflex, he tends to aspirate the blood into his lungs and may drown in his own blood We have each had examples of this recently, the patients only being saved from death from asphyxia by a rapid tracheotomy, after which they at

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[1] Kilner T P *Med. Pr* 1941 205 26

[2] National Research Council Manual of standard practice of Plastic and Maxillo Facial Surgery, Philadelphia, 1942

once coughed considerable amounts of blood back through the tracheotomy tube. At first sight intravenous anæsthesia by pentothal might be thought to solve the difficulties, but Major Ascroft tells us that he had a case in which asphyxial symptoms developed so quickly after intravenous injection that the patient's life was only saved by a rapid plunge laryngotomy and it would seem that the respiratory depressant effect of the usual intravenous anæsthetics is an additional disadvantage. In view of these experiences, therefore, we suggest that the standard initial emergency treatment of the severe types of smashed-in face as described above should be tracheotomy or laryngotomy under local anæsthesia. Once an opening into the air passages has been made, the anæsthetic problem becomes easy, the danger of death from asphyxia is averted, the reduction in cyanosis from the establishment of a free airway may by itself result in cessation of much of the hæmorrhage, and the surgeon can if necessary proceed to further measures for the local control of hæmorrhage, the approximation of the soft tissues, and the correction of gross bony displacement.

The essential task of the emergency surgeon is now finished, and it remains only for him to dispose of the case for its final treatment. In most cases this means its early transfer to a special faciomaxillary unit. But there may be emergency aspects other than those he has successfully dealt with. In the first place, the eyes may be damaged; one of our cases had a ruptured globe and bilateral retinal detachment and was rendered almost totally blind. The damage to the eyes may be concealed by the swollen eyelids. A deliberate inspection of both eyes by the gentle insertion of small retractors under the swollen lids and, in any case of doubt, an immediate opinion from an ophthalmic surgeon would therefore seem to be an essential duty of the emergency surgeon. Secondly he should bear in mind the possibility of cerebrospinal rhinorrhœa and the cerebral surgeon's interest in getting cases with this complication early. And, finally, the routine administration of one of the sulphonamides may be valuable in preventing aspiration pneumonia and local sepsis.

CONCLUSIONS

The severely smashed-in face is a clinical entity with clearcut emergency features.

In difficult cases emergency tracheotomy or laryngotomy may be life-saving.

The duties of the emergency surgeon in these cases are: (*a*) to deal with hæmorrhage and gross soft-tissue and bony damage; (*b*) to inspect the eyes and, if necessary, to secure the coöperation of the ophthalmic surgeon; (*c*) to be on the look-out for any suggestion of cerebrospinal rhinorrhœa; (*d*) to administer prophylactic sulphonamides.

Having completed the emergency treatment, early transfer to a special faciomaxillary unit should be arranged.

Diagnostic X rays have little place in the emergency treatment of these cases, and time should not be wasted in trying to obtain them.

Reviews of Books

Ear, Nose and Throat in the Services

R. SCOTT STEVENSON, MD EDIN, FRCSE, major RAMC. (Humphrey Milford, Oxford University Press. Pp. 116. 5*s*.)

THIS book is really an elementary primer on ENT disease, with here and there an allusion to Service—chiefly Army—problems. It is intended for "the average medical officer" in the various services (which makes it the more regrettable that so much space should be given to tracheotomy (after the author has stated that it should never be done except as a set formal procedure), submucous resection of the septum and tonsillectomy. Qualified ENT surgeons are employed by all the Services for hospital work, and are by definition familiar with the more simple operations. The medical officer in the Services has the same sort of ENT problems to face as a general practitioner in civil life—it is the disposal, not the treatment, of these cases that presents difficulties. In the Army, men with active chronic middle-ear suppuration (who should never have been passed fit by the medical boards) are retained and treated, and even have radical mastoidectomy done. In the RAF, these men are generally invalided out, unless they have been overlooked sufficiently long for them to have acquired trades, or unless they are trained permanent staff. Radical mastoidectomy is only performed if urgent symptoms make it necessary. Airmen are regarded as unfit for overseas duty if they have a perforation in either drum, whether or not the middle ear is moist or dry. But these, and certain minor discrepancies, will not affect the average MO's pleasure in rubbing up his knowledge of upper respiratory tract disease in an entertainingly-written manual.

Notes for the RMO of an Infantry Unit

C. P. BLACKER, MC, MA, DM OXFD, FRCP, late RMO, 2nd Batt. Coldstream Guards. (Oxford Univ. Press. Pp. 77. 5*s*.)

Dr. Blacker has had three years' experience as a regimental medical officer in the present war; he served as a combatant officer in the last. Obviously he knows how to pick good men. Having done so, he trains them to shoulder responsibility and to show initiative in routine duties, thereby increasing their capacity to cope with an emergency. Some of his own methods of dealing with the problems confronting a regimental medical officer are original; all are practical—for example, his method of tackling venereal disease. He holds the view that continence is more usual among soldiers than is generally supposed. But for the few he provided condoms in preference to emergency treatment packets, which, with their complicated ritual, are not popular, and not very practical for men who may not be quite sober. The condoms, bought through a loan from the CO's fund, were retailed at a small profit by the senior stretcher-bearer in each company, who was thus provided with "a simple exercise in keeping accounts"; and the arrangement gave reasonable privacy to the buyer. The profits—consumption was not heavy—went into a small regimental aid-post fund. Throughout the book the author looks at his work from other angles than his own; he appreciates the viewpoint of the ADMS, of the company officer, and most of all of the men under his care. Even experienced RMOs will pick up useful wrinkles, and those newly appointed will find help on every page.

Essentials of General Anæsthesia

(3rd ed.) R. R. MACINTOSH, DM OXFD, FRCSE, DA; FREDA BANNISTER, MD LPOOL, DA. (Blackwell. Pp. 341. 16*s*.)

WRITTEN for senior students, there is much in this well-established book to interest anæsthetic specialist. The chief difference between this edition and the last is the addition of a chapter on the Oxford vaporiser, where happily there has not been the usual lag between scientific conception and practical applications. Although complete where dental operations are concerned, more guidance would be welcome in the management of special operations on other regions, such as the thyroid, the abdomen and the brain. As it stands, the book remains an excellent exposition of the general principles of anæsthesia and the illustrations are of a very high order.

Urology in War

CHARLES Y. BIDGOOD, lieut.-commander (MC) USNR, chief urologist, U.S. Naval Hospital, Washington, DC. (Baillière. Pp. 78. 11*s*.)

IN this authoritative little book Commander Bidgood describes the treatment of genito-urinary lesions in a well-equipped military hospital. He does not tell the reader about the treatment of war wounds of the genito-urinary tract, and how these wounds should be handled during the journey from the front to the base hospital; and he says nothing about the various types of wound that will be met with or of the damage inflicted by different varieties of missle. To this extent the author does not achieve his aim of providing a book "to serve as a reference for officers aboard ship or in isolated outposts who may be confronted by such emergencies and forced to ope with them." But it will be useful to general surgeons working at the base who have had only limited urological experience.

THE LANCET

LONDON: SATURDAY, AUGUST 7, 1943

TOXINS AND SHOCK

THE story of shock is still far from complete. Interest in it rises and falls with the wars that seem to be part of our destiny. In 1918, after four years of intensive investigation, a conclusion had apparently been reached. The work of DALE, LAIDLAW and RICHARDS, and CANNON and BAYLISS, had provided evidence that a toxic substance (or substances) was formed in injured muscle, and that this was absorbed into the general circulation, where it induced widespread capillary damage with leakage of plasma into the tissues: thus the reduced blood volume and hæmoconcentration reported in casualties from France were explained. With this theory of traumatic toxæmia, the word histamine was commonly associated; but the originators of the theory, though they emphasised the similarity between histamine poisoning and shock, did not claim that the two were identical. It was later realised that skeletal muscle is relatively poor in histamine and could not produce enough to account for the circulatory changes in shock; increased quantities of histamine, moreover, could not be found in the blood of injured animals. This failure to incriminate histamine tended to discredit the idea of traumatic toxæmia. MOON maintained his faith in the reality of an elusive toxin or toxins, but most other workers focused their attention on BLALOCK'S explanation of shock in terms of fluid loss at the site of injury, and on O'SHAUGHNESSY and SLOME'S revised theory of nervous exhaustion.

With the outbreak of the present war, research was again intensified. It became evident that we had fallen into the habit of thinking of only one factor as the cause of shock, whereas probably there are several acting at the same time. Thus the various hypotheses already mentioned may each furnish part of the answer. While BLALOCK was able to demonstrate that local fluid loss was sufficient in most of his experiments to kill his animals, there were instances in which some other factor seemed to be operating. Similarly WILSON and ROOME were satisfied that death following the removal of a tourniquet which had been applied to a limb for several hours could usually be explained by the leakage of plasma into the limb from the capillaries damaged during the period of ischæmia; but they found that amputation of the limb at the level of constriction, and the transfusion of blood or plasma, did not always save the animal as might have been expected.

Elsewhere in this issue, GREEN, and BIELSCHOWSKY and GREEN, report observations on limb ischæmia in a number of different species. They set out to investigate the crush syndrome by producing hind-limb ischæmia, but were led by their preliminary results to a renewed search for the muscle toxin postulated by DALE, CANNON and BAYLISS after the last war. Their experiments have been laborious and tedious, and at times must have been disheartening; the apprehension of a toxin has been bitterly compared with the mapping of an amorphous dung-heap. Nevertheless, by patient endeavour they have been able to show that an extract (muscle shock factor, MSF) can be obtained from skeletal muscle which will reproduce on injection the signs and symptoms that follow removal of a tourniquet from an ischæmic limb. Further analysis of this purified extract has revealed that the greater part of its activity is probably attributable to adenosine triphosphate. Like limb ischæmia—though not to the same extent—MSF causes depression of renal function with uræmia and raised non-protein nitrogen; in about a quarter of the animals that survive, the urine contains albumin, granular casts and red cells, and occasionally there is frank hæmaturia. The histological changes in the kidneys are not great, but combined injection of myohæmoglobin and MSF will produce definite renal damage—dilatation of the second convoluted and other tubules, with amorphous brownish-yellow casts in large numbers. Before the significance of MSF can be properly assessed it will have to be proved that the condition following its injection is identical with the condition following limb ischæmia. It must be shown either that the blood or tissues of the animal suffering from limb ischæmia contain MSF in substantially greater quantities than are found in any other morbid state or in the normal animal, or else that MSF can be used to immunise the body against shock. The substance is destroyed in the tissues so rapidly that the first of these alternatives will probably be hard to achieve; and experiments designed to prove the other have so far been unsuccessful. The instability of MSF probably explains the lack of success of previous seekers for a muscle toxin.

Though much remains to be done before MSF can be held responsible for any of the effects of tissue damage in animals—let alone in man—GREEN and BIELSCHOWSKY have made a valuable contribution to a difficult and very important problem. Their isolation of a chemical substance is in itself a great advance.

CALIBRATING THE PELVIC CANAL

OBSTETRICIANS as a class are becoming X-ray conscious, and are ever more calling on the radiologist to help in detecting cephalopelvic disproportion. There is perhaps no harder task. The pregnant woman is fat, broad and deep, and pictures of good quality are difficult to get. Long exposures are necessary, and equipment must be carefully nursed if it is to stand up to this heavy work. In normal times a tube replacement may mean a bill of £50; nowadays more than money is required to make good its loss. For these reasons radiograms should be asked for only when some clear purpose is in view and clinical examination has failed to give adequate guidance. Much ingenuity has been shown in devising methods by which the magnified, and sometimes distorted, shadows of the pelvis can be made to show the true pelvic size and form. For routine work the technique must not be difficult or complicated, and reading the results must not be unduly time-consuming. Ideally, the radiogram should show the anteroposterior diameter of the pelvic brim (the conjugata vera); the anteroposterior diameter of the lower pelvis (pubosacral); the transverse diameter of the brim; the distance between the ischial spines; and the size of the pubic arch. In addition, it should enable some estimate to be made of the size of the fœtal head, and if possible should supply a measurement of its biparietal diameter. These requirements are exacting enough, but their attainment serves only to set a new problem—the interpretation to put on the various measurements obtained. The difficulties are many. Errors of technique tend to exaggerate the size of the fœtal head and minimise the size of the pelvis. Absolute measurements are less important than relative measurements, and the pelvis as a whole must always be considered rather than the size of one particular dimension. There is a tendency for the inexperienced worker to take an unnecessarily gloomy view of supposed disproportion.

ROHAN WILLIAMS [1] urges the routine use of a two-plane projection of the pelvis. From pictures so obtained the pelvic size and shape can be reproduced in outline form on paper. An ellipse, representing the estimated size of the fœtal head, is cut from a piece of paper and manœuvred through the artificial pelvis. Disproportion, if present, is then readily estimated. Somewhat similar methods have been described by THOMS [2] and by MOIR.[3] WILLIAMS shows pelvimetry tracings of 22 cases and gives details of the clinical course of labour in 13 that were classed as "border-line." In 7 of these the radiological forecast was later justified, in 3 cases the prognosis had been non-committal, and in 3 others the prognosis made was later proved wrong. These examples include early cases, and with increased experience some of the errors would have been avoided. MOIR [4] uses three views of the pelvis—a lateral radiogram, a "plan" view of the brim obtained with the patient in the reclining position, and a view of the pubic arch. He thinks the lateral view the most important. This is obtained with the woman standing up. By a simple arrangement of wooden pegs, against which the patient presses her anterior superior spines, a true lateral position is easily secured, and the patient kept motionless during the exposure. MOIR discusses such complicating factors as head moulding and the rate of head growth. Moulding is relatively easy and safe in a small fœtus but more difficult and dangerous in a large postmature fœtus with a well-ossified head. Pelvic shape is important as well as size. Thus, prognosis is more favourable with a pelvis deformed by rickets than with a generally contracted pelvis with a brim conjugate of the same size. This was exemplified in 2 cases in which the conjugate measured 3½ and 3¾ in.; vaginal delivery was relatively easy in the first but impossible in the second. Radiography is thus of value in revealing pelvic type, as well as in showing the precise dimensions, such as the traditionally honoured conjugate of the brim. Radiography is especially useful in breech presentation, where the clinical test of gauging the head against the pelvic brim is not available. In assessing pelvic disproportion charts are used to show pelvic shape and capacity in relation to head size. NICHOLSON [5] has studied the pelvic capacity of healthy women in a rural district of England, and a somewhat similar investigation has been made in London by INCE and YOUNG.[6] Some textbook statements regarding pelvic size will have to be revised in the light of the new facts now established. NICHOLSON assesses disproportion by calculating the area of the pelvic canal at the brim and at the level of the ischial spines. He visualises the moulded fœtal head as a circle, the cross section area of which he reckons in terms of the biparietal diameter. For easy delivery he believes that the area of the head so calculated should not exceed 80% of the area of the brim. In the lower pelvic plane the limit of safety is probably considerably higher. NICHOLSON [7] also expresses his findings in another form. Having regard to the incidence of the different sizes of fœtal heads at term, he concludes that a pelvis with an area of 110 sq. cm. at the brim can pass 99·9% of all fœtal heads; a pelvis of 100 sq. cm. can pass 97%; a pelvis of 90 sq. cm. can pass 70%; while a pelvis of 80 sq. cm. can pass only 21% of all fœtal heads. Similar calculations have not yet been made for contractions in the lower pelvis.

It is wrong to suppose that the radiologist can now supplant the clinician in deciding the best treatment in doubtful cases of obstetric disproportion. Indeed the problems involved are so complicated that it i doubtful if he ever will. Nevertheless, in some directions radiography can give information more preci than that obtained by usual clinical methods, and ca thus help to bridge the gap sometimes left by the methods. Thus far radiologists and obstetricians ha been feeling their way. Soon a firmer guidance ca be expected, and with it will come a clearer understanding of the scope and limitations of pelvic and cephalic mensuration.

MEDITERRANEAN ANÆMIA

THE name of COOLEY is associated with a seve anæmia that affects children of parents of Medite ranean stock. Its characteristic features are we marked hypochromic anæmia with numerous norm blasts in the blood, enlargement of the spleen an sometimes of the liver, a mongoloid facies, oste porosis with peculiar X-ray appearances, especial in the skull, which shows a perpendicular striation the diploë, and decreased fragility of the erythrocyte the disease is familial, few children survive mu beyond their first decade; iron, liver, and splene tomy have all been tried without effect. It is now realised that this syndrome represents the sev form of a widespread hereditary hæmopoietic dis and that there is a whole series of cases ranging f this severe form to non-anæmic persons in whom of the typical blood changes can still be found. analogous series is already known in the group cases called familial acholuric jaundice; in disease there is increased fragility of the erythroc and blood-films show small densely staining cytes known as spherocytes. These spherocytes sometimes increased fragility, sufficient to be det by our rather crude methods, have been found in apparently unaffected relatives of patients frank acholuric jaundice, and investigations of sort have helped in establishing the familial na of the disease. In Mediterranean anæmia the decreased erythrocyte fragility and the peculiar seen in blood-films is the unusually thin red cell shows up sometimes as a "target cell,"—a cell dense central spot in an otherwise pale interi sometimes as a hypochromic but large cell.

By searching for these abnormal cells and te the red-cell fragilities in relatives of cases of Cooley's anæmia, it has been found that the syndrome is actually very widespread in its mild forms and that there is a definite hereditary basis for it. CAMPINOMETROS,[1] working in Sicily, thought that there might be a Mendelian recessive mode of inheritance. DAMESHEK,[2] who has recently described a further series, is less dogmatic, but finds the target-cell syndrome present in both parents and certain siblings of cases of Cooley's anæmia. Van RAVENSWAAY, SCHNEPP and MOORE[3] have described a case in a Greek patient who had reached the age of 31; out of his 4 children, 3 had died of Cooley's anæmia and there is suggestive evidence that his parents' families were widely affected. SMITH[4] of New York investigated 16 families in whom children had developed classical Cooley's disease or a moderate but refractory anæmia; out of 63 persons, blood changes typical of Mediterranean anæmia were found in 54. SMITH regards the decreased fragility to hypotonic saline as the most useful single test and points out that, though target cells were only found in half his cases, all except one had decreased fragility and their blood-films showed other evidence of the presence of thin cells such as hypochromic polychromatic macrocytes—an unusual combination. The sternal marrow showed normoblastic hyperplasia with the same red-cell abnormalities as the peripheral blood. SMITH is in no doubt about the hereditary nature of the disease and points out that a mildly affected patient may have severely affected children; but he has not sufficient evidence to determine the exact mechanism. The mild cases seem to live normally without inconvenience; for the others no treatment has had any effect—iron, liver extracts, vitamin-B complex in various forms are no use; splenectomy makes them worse. A severe anæmic episode or an intercurrent infection is the normal termination. Van RAVENSWAAY's patient described a local Greek method of treatment that he had himself experienced; it consisted in a primitive form of wet-cupping, with pressure on the spleen applied by hooking the edge of the enlarged organ over the top of a fence and then hanging suspended with both feet off the ground.

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[1] Williams, E. R. *Brit. J. Radiol.* 1943, 16, 173.
[2] Thoms, H. *Amer. J. Surg.* 1937, 35, 372.
[3] Moir, J. C. *Edinb. med. J.* 1941, 48, 361.
[4] *Proc. R. Soc. Med.* 1943, 36, 359.
[5] Nicholson, C. *J. Obstet. Gynæc.* 1938, 45, 950.
[6] Ince, J. G. H. and Young, M. *Ibid*, 1940, 47, 130.
[7] Nicholson, C. *Biometrika*, 1941, 32, 16.

In the Mediterranean area the most important differential diagnosis is from chronic malaria. The combination of chills, fever and splenomegaly occurs in both, and van RAVENSWAAY quotes a statement from a Greek source about "hereditary malaria"; were these really cases of Mediterranean anæmia and would target cells have been found in their blood if they had been looked for? It is notable that most of the observations on Mediterranean anæmia have been made on persons born in Italy, Greece or Syria and their children who had emigrated to the USA; records from the Mediterranean countries themselves are few. These countries are now much in the news and the time may be near when relief-measures among their debilitated populations, many of them anæmic, will have to be undertaken. To the common causes of malnutrition and malaria, it will be well to add this Mediterranean anæmia syndrome. We do not know how widespread it really is, but the characteristic red-cell changes are not difficult to detect even if fragility tests are impracticable in the field, and we do know that it is refractory to treatment; a search for these features in the blood of patients not responding to antianæmic or antimalarial treatment may give us new knowledge of this syndrome, and prevent mistakes in assessing the value of these treatments.

Annotations

COLLECTION OF CASUALTIES

IN the British Army each battalion or equivalent unit has a regimental medical officer. In the ordinary way the RMO is the sole representative of the RAMC attached to the unit, and he must find his assistants from its strength: thus his orderlies, NCOs and stretcher-bearers may be infantrymen, sappers or gunners, trained in first aid, but they are seldom members of his own corps. The United States Army works on the opposite principle. An American regiment, which corresponds to our brigade, normally has its own regimental medical detachment from the Medical and Dental Corps, and this is divided so that each battalion has a substantial medical section, comprising officers, NCOs, and other "medical soldiers." The arrangements are such that every platoon has the services of a trained orderly from the Medical Corps who accompanies it into action. The Americans like this system because there is never any question of reducing the fire-power of combatant units by assigning combatant personnel to medical duties; because training as a combatant is not wasted on someone who will be stretcher-bearing; and because they think their litter-bearer, as they call him, will be better trained if he is trained exclusively for his medical task.[1] The arguments in favour of the British system need not be stated here; but it must be admitted that the regular provision of medical personnel for our troops is on a less generous scale.

The Americans have lately described their routine for picking up wounded.[2] Each man carries, fastened to his belt, a first-aid package and a package containing sulphadiazine in tablets and powder. If conscious and able to do so, he is expected to dust the powder into his wound, apply his field dressing, and take the tablets by mouth. "In all probability, however, a hospital corpsman has reached him before he has a chance to do this." This hospital corpsman is the aid-man of his platoon, whose job it is to give urgent first aid, including an injection to stop pain. "He does not remain with the fallen soldier, as he has to move forward with the attack. After treatment he ties a tag to the soldier's belt telling what type of treatment was administered, fixes a bit of gauze to a bayonet or stick to mark the place where the soldier is, and goes ahead. Now come the litter-bearers, attracted by the white cloth"; and the patient is taken to the battalion or regimental aid station, where he may be given a transfusion of plasma, and is made ready for the first stages of his journey to the base.

Picking up casualties, however, is not always as easy as it may seem. Compared with his predecessor on the Western Front in 1914–18, the stretcher-bearer today has less to fear from mud, and is helped both by wireless information and by an abundance of motor transport. Indeed, he may become almost superfluous where a vehicle can be taken to the patient instead of taking the patient to a vehicle; and this has generally been possible in the recent North African campaign. On the other hand, the rapid movement of mechanised units means that casualties may be scattered over wide areas, and during contact with the enemy the troops may be unable

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Campinometros, J. *Ann. Med.* 1938, 43, 27 and 104.

Dameshek, W. *Amer. J. med. Sci.* 1943, 205, 643.

Van Ravenswaay, A. C., Schnepp, K. H. and Moore, C. J. *Amer. med. Ass.* 1943, 122, 83.

Smith, C. J. *Amer. J. Dis. Child.* 1943, 65, 681.

[1] *Army med. Dept. Bull.*, No. 19, January 1943.

[2] Report on Recovery of American Wounded. U.S. Office of War Information. May, 1943.

to spare time even to apply field dressings to their wounded comrades. In considering these factors Major Murray[3] concludes that stretcher-bearers must be disposed so as to provide immediate and essential first-aid, and he has devised a battle-drill for them which reduces searching to a fine art. The squads are trained to make systematic hunts in fields, scrub, woods and houses. During the search each bearer works singly, and when he finds a casualty his duty is merely to stop hæmorrhage and mark the man's position so that this can readily be found again. The squad then re-forms, and, where necessary, removes the wounded in turn to the most accessible place at which they can be transferred to motor transport. As became customary in Civil Defence work during air-raids, first aid on the spot is reduced to a minimum, being mostly left until the patient is in a vehicle. When accompanying troops in action, the bearers must practise fieldcraft and personal camouflage; for they must never be responsible for giving the unit's position away to the enemy. And skill is also called for in "medical fieldcraft"—the approach to, and removal of, the wounded man under fire both by day and by night. In urging the importance of this side of medical work in the field, Murray demonstrates that it often needs a trained mind in a trained body; but undoubtedly motor transport has lightened the physical burden on the stretcher-bearer, and very often it can take his place.

ETHICS FOR THE YOUNG PRACTITIONER

IN an address to Guy's students, Sir Herbert Eason[4] has summarised the standards of professional ethics with the authority of the president of the tribunal responsible for their enforcement. Mention of the Warning Notice issued by the GMC naturally led him to an early reference to the risks of lax certification. He had been appalled, he said, in his hospital experience, to see house-officers signing certificates in blank for sisters or nurses or dressers to fill up afterwards—statements that the patient was suffering from some disability or disease and was unfit to follow his or her employment. He advised students never to sign a blank certificate or any document for the entire accuracy of which they were unable to vouch. "It is no good saying 'I have today examined So-and-so' when in fact you examined him yesterday." Next he expounded the warning against assisting unqualified practitioners. This was "infamous conduct" because it traversed the whole aim of the Medical Acts by obscuring the statutory distinction between the qualified and the unqualified. Administering an anæsthetic to help an osteopath's treatment of patients was covering an unqualified practitioner. But this did not mean that the qualified man cannot ask a masseuse to massage a patient. "You can even ask an osteopath or a chiropractor to assist you in treating a patient so long as the patient is under your own care." Of four other classes of conduct often brought to the notice of the GMC the commonest was that of the practitioner found drunk. The council, explained Sir Herbert, seldom takes a man off the Register for a single conviction of drunkenness; it will give him a warning. A second conviction for drunkenness probably means a stiffer warning. A third is likely to involve action. If a doctor habitually gets drunk, can he be fit to be in charge of patients? It is, of course, a grave matter to remove a man from the Register for three cases of drunkenness. The council may perhaps suspend judgment and put the respondent on probation for a year or so, requiring certificates as to his behaviour in the interval and insisting on an undertaking for good behaviour in future. Drunkenness in charge of a motor-car is more seriously regarded. It shows not only over-indulgence in alcohol but also a reprehensible absence of responsibility. A man who, when under the influence of alcohol, thinks himself fit to drive a dangerous machine like a car is a menace both to his patients and to the public. The other three classes of professional misconduct were described as the three As—advertising, abortion and adultery. The first includes those flattering little paragraphs about the distinguished surgeon or eminent physician and his well-known patients—laudation which a few practitioners signally fail to avoid, to the detriment of their more honourable and reticent brethren. The second, abortion, is, as the law stands, a felony punishable with penal servitude. Whatever views practitioners may hold about birth control, whatever appeals may be made to them to save an innocent's girl's reputation and her family's credit and social standing, they must realise that the GMC cannot ignore what the state regards as a serious crime. Lastly, a charge of adultery means that the council, without pretending to be a court of morals, must protect the public. Adultery per se is not infamous conduct in a professional respect, but, if committed with a patient or a member of a patient's household, it is a breach of trust and an abuse of confidence. To his admirable exposition of the professional code, and his virile statement of the things which are "not done," Sir Herbert Eason added two precepts of worldly wisdom. The practitioner who is charged in the police-court with drunkenness or other offences should never allow himself to be persuaded to plead guilty by the argument that he will thus escape publicity. Secondly, as soon as he is qualified, he should join one of the well-established medical defence societies. This will protect him from the formidable risks of practice, whether they arise from the accusations of female patients or from any other source. It will ensure for him legal advice and assistance from the day of his registration to the day of his retirement, amid unforeseen dangers which even the greatest care can hardly avoid.

CONTINUOUS SPINAL ANÆSTHESIA

THE continuous technique frees spinal anæsthesia from the disadvantages of single-dose administration; and though the minimum dose which must be given for abdominal anæsthesia will allow sufficient operating time for most cases there are occasions when a chance to lengthen anæsthesia is welcome. The method will therefore apply chiefly to operations lasting longer than 1–2 hours. In the last few years, though simpler and safer methods have been developing, spinal anæsthesia has once again suffered from the enthusiasm of its new recruits, and those contemplating using the cc method should take to heart Nosworthy's advice, q by Lee (p. 156), to learn the old technique first and th the new one developed from it. Lemmon and Paschal who first described the method, found it difficult maintain a good puncture with the patient lying on back. The divided mattress and the malleable nee overcame this trouble. The malleable needle may in long run prove the best safeguard against breakage of spinal needle, an accident sufficiently serious to make use of a hard steel needle a real danger. Reports so indicate that spinal anæsthesia maintained over se hours does not produce any detectable damage to central nervous system; but the use of 5% procaine glucose may be compared (not without app with the 0·5–1% used for nerve blocking elsewh Fraser[2] obtained satisfactory results with 1% and it should be borne in mind that lesions of the equina have followed the use of strong procaine sol Except perhaps in the hands of experts, the use of technique for operations like appendicectomy, tomy and colostomy, seems unjustified, for the chance anæsthesia wearing off before the operation is fini

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[3] Murray, R. O., *J.R. Army med. Cps*, June, 1943, p. 291.

[4] *Guy's Hosp. Gaz.* July 10, 1943, p. 147.

1. Lemmon, W. T. and Paschal, G. W. jun. *Ann. Surg.* 1940, 111,
2. Fraser, R. J. *Anæsth. & Analges.* 1943, 22, 38.
3. Ferguson, F. R. and Watkins, K. H. *Brit. J. Surg.* 193 25, 735.

hardly offsets the greater difficulty of the continuous method. Whether the weight of procaine to be given for spinal anæsthesia has any close relationship to the total weight of the patient is still undecided, and it would be easy to give an overdose to an obese patient if the body-weight was taken as the sole criterion in assessing the amount. Enough is known about the action of analgesic drugs on nerve tissue to suggest that the dose of analgesic drug should be graded according to the number of nerve segments to be rendered analgesic.[4]

VERIFICATION TEST FOR SYPHILIS

IN laboratories where large numbers of serological tests for syphilis are being carried out there is always a small proportion of sera in which a doubtful positive is obtained. Beveridge[5] describes a supplementary procedure for classifying these results as definitely syphilitic or non-syphilitic, known as the Kahn verification test. In 1940 Kahn pointed out that there are two types of positive reaction, the first directly associated with the immunological reaction to syphilis, and the second related to biological changes which may occur in the absence of syphilis. The positive reacting sera of normal animals belong to the second group. These two types of reaction are not differentiated by the standard serological tests, but if the Kahn test is carried out at different temperatures well-marked differences appear. The sera of syphilitic patients show a much stronger reaction at 37° C. than at 1° C. whereas the reverse is seen with non-syphilitic positive reactors. For verification purposes the standard Kahn test is done in duplicate. In one test all the tubes, pipettes, reagents, &c. are heated to 37° C.; in the other they are cooled in an ice-water-bath at 2° C. The sensitivity of the Kahn test is greatly increased when performed at 37° C., and sera which are doubtful or weakly positive by the ordinary tests give clear-cut results, while the false "biological" positives may fail to appear at this temperature but are accentuated at [illegible] which are negative [illegible] at 37° C. but none [illegible] non-syphilitic patients show no precipitation at 37° C. and 2° C., or some precipitation at 2° C. only. The Kahn verification test should be useful where normal serological tests are doubtful, or where the patient's clinical condition does not justify a diagnosis of syphilis. It has the merit of being easy to carry out.

THE LYMPHATICS

IT has been said that progress in experimental medicine will only follow the development and mastery of new techniques. The truth of this is well illustrated by the work of the Harvard school of physiologists on the function of the lymphatic system. In his Lane lectures Drinker[6] has presented his experimental findings in their historical context, and drawn some practical lessons from his results. The function of the lymphatics—the lymph-nodes are not considered—can only be understood when studied in relation to the behaviour of the blood-capillary circulation. Together these two systems control what Claude Bernard called the *milieu intérieur* of the body. From relatively simple beginnings in the fish both systems become highly complex in mammals, where they must be ready to meet a wide range of demands made on them by the different tissues. Data obtained by considerable experimental dexterity and the application of microscopical and microchemical methods allow the following conclusions to be drawn with regard to the circulatory exchanges controlling the nutrition of the tissues. There is a constant escape of water and crystalloids with a small quantity of blood protein from the normal resting blood capillaries. Activity or injury brings about a greatly increased capillary circulation in the tissues, and results in a greater loss of fluid and protein from the vessels. Were the escaping protein allowed to accumulate in the tissues its osmotic effect would prevent fluid re-entering the capillaries, and the tissues would become waterlogged. The protein, unable to pass back into the blood capillaries, readily finds its way into the lymphatics, and, where the part is moving, it is rapidly carried away in the lymph stream back into the blood. In a patient lying in bed for weeks on end, it is obvious that there will be no lymph circulation from many parts of the body. One would expect, therefore, that the protein would accumulate and the tissues rapidly become waterlogged. The fact that in many cases this does not happen is explained by a suggestion that the escaping protein is metabolised in situ by the tissues.

It was Hunter who first described the lymphatics as the great collecting system of the body, and they can undoubtedly take up particles of considerable size from the tissues. The walls of the lymph capillaries, though thin, are continuous, and firmly anchored to the surrounding tissues. The entry of particles into their lumen is probably the result of the minor stresses and strains resulting from movement. A similar mechanism probably explains the fact that red blood corpuscles may leave normal blood capillaries in small numbers while the bulk of the blood proteins are held back. Originally the lymph flow, with the exception of that from the thoracic duct, could only be studied as it left limbs that were continually massaged or kept constantly moving. Cannulation of the lymphatics from the heart and from the lungs has provided a constant stream of lymph from normally functioning organs. Among other things, such experiments have shown how extremely sensitive are the blood capillaries to anoxæmia. Thus the reduction of the oxygen saturation of the blood to 50% for a very short time leads to serious and irreversible changes in the capillary walls. It is important to remember this when the need for oxygen therapy arises. Oxygen should be given at the earliest opportunity; otherwise there will be a continuous extravasation of fluid into the tissues of the alveoli which will prevent further absorption of oxygen regardless of its concentration in the alveolar air. The lymph vessels of the skin are more capacious than the blood capillaries and they anastomose widely. There is little need for an active circulation to dispose of the small quantity of fluid escaping into resting tissues. Acute inflammation results in an excessive production of tissue fluid, and if the process develops rapidly it may give rise to a spontaneous flow of lymph. This flow by itself never suffices to remove all the escaping fluid, and so œdema results. To encourage lymph flow in order to reduce the œdema after acute inflammation is inviting danger. Where the inflammation has a bacterial origin, the organisms will be carried away in the lymph to reach the general circulation. Drinker believes that if this accumulation of fluid with a high protein content is allowed to persist round injured tissues an excessive growth of fibroblasts will take place, and subsequent scarring will be denser. [illegible] of all dead tissue to prevent further irritation of the surviving tissues, and complete rest to reduce the demands of the tissues for blood to a minimum. To this advice the surgeon would add the provision of external drainage, which seems to play its most important part during the first 48 hours in the case of an uncomplicated wound or burn. When adequate drainage has been provided it is permissible to apply uniform firm pressure to prevent swelling of the tissues. Turning to another

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field Drinker also offers an explanation of the changes found in pulmonary silicosis. The fibrosis in the lungs develops as a result of chronic lymph stagnation and the accumulation of protein-rich fluid. This is brought about by the fibrotic stricture of the lymphatic vessels round the silica particles carried to them from the pulmonary alveoli.

There remain a number of unsolved problems in this field. For instance, why does the flow of lymph from the same organ vary widely from one animal to another of the same species ? The quantities of lymph obtained bear no relation to the weight of the animal, but may conceivably reflect some difference in its nutritional state. The *function of the intestinal lymphatics* is not clear. It has yet to be shown experimentally what proportion of the fat ingested by a mammal leaves the gut by way of the lacteals. At the same time the thoracic duct provides a bypass enabling certain products of digestion to reach the blood without first having to pass through the liver. The answer to these and similar questions is most likely to come from the application of the careful experimental methods well illustrated by the work of Drinker and his colleagues.

PROFESSIONAL FREEDOM AND THE LCC

LAST week opened well for lovers of liberty ; and on Tuesday the London County Council carried on the good work. The first of two significant decisions affecting its medical staff concerns the censorship of scientific books or articles by administrative superiors. Doctors employed by the LCC have been perfectly free to publish books and papers so long as they did not refer to their connexion with the council ; but if they wanted to mention their appointment they were obliged to show their draft to the head of their department so that he could satisfy himself "that no question of policy likely to implicate the Council is involved." In its report presented on Tuesday the general purposes committee suggested that officers should be encouraged to write on their own technical or scientific subjects, and that it can safely be left to their discretion not to publish any book or article in their official capacity which will seriously implicate or embarrass the Council in regard to its policy. Accepting this view, the LCC has decided that, in writing on purely technical or scientific subjects, medical and other officers may state their LCC appointment without asking leave of their departmental chief. This enlightened ruling is, we suspect, not altogether unrelated to the call for "scientific freedom" raised by Dr. Geoffrey Bourne and others in the *British Medical Journal* during the past few months ; and the second decision reached at the same meeting also betokens a welcome sensitiveness to medical public opinion. An experiment, it was agreed, is now to be made at St. James' Hospital, Balham, by which the medical superintendent will devote himself entirely to administration, and the complete clinical charge of patients will be divided between the heads of the medical, surgical, and obstetrical departments. This is another step towards liquidating the hierarchical system which has been one of the major flies in the ointment of municipal service.

ARTIFICIAL INSEMINATION

THE House of Lords, as reported on page 176, has been debating artificial insemination. In the USSR and USA especially, this practice is now widely employed by stockbreeders, who benefit greatly by a method which allows one bull to sire as many as 1000 calves in a breeding season. The rapid development of artificial insemination of animals is no doubt responsible for the new interest in its application to human beings, either as a eugenic measure or as a means of relieving the unhappiness of involuntary sterility. In the United States its use for this last purpose has evidently been making headway. A survey sponsored by the National Research Foundation for Eugenic Alleviation of Sterility provided particulars of 9489 women who had achieved at least one pregnancy by artificial insemination, and in 3649 of these the semen came from a donor other than the husband.[1] More than 97% of these pregnancies are said to have yielded normal babies.

Guttmacher [2] classifies the indications in three main groups. In the first of these, intravaginal coitus between husband and wife is impossible because of mechanical factors, among which he includes impotence, hypospadias, vaginismus, and excessive obesity. Probably all doctors will agree with John Hunter that in such circumstances artificial insemination is right and proper. There is neither moral nor legal objection ; the child will no doubt be accepted at law as the true offspring and heir of the parents concerned. Guttmacher's second group comprises a miscellaneous collection of conditions including (in the woman) genital hypoplasia, cervical stenosis, uterine malpositions, and (in the man) subnormal semen. In such cases the indications are, to say the least, less definite ; for these conditions are mostly amenable to treatment and should be treated accordingly. The third group—the controversial one—is that in which semen has to be provided from an outside donor, either because the husband is sterile or because he carries hereditable characters that make it inadvisable for him to beget children. The husband who discovers that he must not or cannot have a child of his own may share his wife's wish that she should be enabled to bear healthy offspring.

There is, as we have said, no legal or moral problem when the husband provides the semen ; but both lawyers and moralists are profoundly concerned when insemination is performed out of wedlock. As the law stands, the child conceived in this way is a child of uncertain parentage ; and Guttmacher, writing for Americans, recommends that, to avoid litigation later, it should always be adopted by its mother and nominal father.

SIR BECKWITH WHITEHOUSE, professor of midwifery and diseases of women in the University of Birmingham, died suddenly in London on July 28. He had just been nominated president of the British Medical Association for a second year. He was in his 61st year.

We also regret to announce the death on July 27 of Dr. JOHN GILMOUR, for many years senior regional medical officer to the Scottish Department of Health.

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1. Seymour, F. I. and Koerner, A. *Ibid*, 1941, **116**, 2747.
2. Guttmacher, A. F. *J. Amer. med. Ass.* 1942, **120**, 442.

PORTABLE X-RAY UNITS.—In response to an appeal by Mr. Derek McCulloch for £1500 to provide a mobile X-ray unit listeners *to the Children's Hour have contributed* ten times this amount and £300 has been spent on a mobile X-ray unit which was presented on their behalf to Sir Ernest Clarke, chairman of the home service ambulance committee of [illegible] Joint Red Cross. The unit, which has been constructed under the direction of Mr. H. T. Ferrier, FSR, carries a team of three—senior radiographer, dark-room assistant, and driver-mechanic—and is self-contained with its own generating equipment, a high-power X-ray unit, spare X-ray tubes, and a dark room. It can be adapted for different kinds of [illegible] In its simplest form a single transformer tank, easily carried by two men, can be set up *at the patient's bedside* with the control table to produce 125 mA at the usual kV values for rapid bedside chest work. For routine chest work at a clinic two small valve tanks, each handled by one man, can be joined up as a four-valve set producing 250–300 mA. The exposure of $\frac{1}{25}$–$\frac{1}{20}$ sec. at the usual teleradiographic distances is the fastest yet obtainable under mobile conditions. The control table and the other parts of the apparatus may be switched and connected to allow mass miniature radiography. [illegible] and identification system are automatic. A system [illegible] lagging, reverse action fans and thermostat keep the inside *of the car and the processing units at an even temperature.* Eleven portable X-ray units are also being supplied to children's hospitals in this country and £6000 has been sent to buy X-ray equipment for the benefit of children in Russia.

Special Articles

CHOLERA IN HONG-KONG

P. B. WILKINSON, M B LOND, M R C P
DISTRICT MEDICAL OFFICER, CYPRUS; LATELY MEDICAL OFFICER, COLONIAL MEDICAL SERVICE, HONG-KONG

CHOLERA appeared in Hong-Kong in 1937 after an absence of some years. The outbreak was a severe one, and out of a total of 1690 cases there were 1082 deaths. I saw only the tail-end of this epidemic, during which hypertonic saline was, so I understand, used as routine treatment. From 1937 on, the disease remained endemic in the colony, presumably owing to the creation of [illegible] was found [illegible] t before the [illegible] years 1938, [illegible] repared for [illegible] icacy of the control measures employed:

	1938	*1939*	*1940*
Cases	547	708	647
Deaths	363	148	331

In 19[illegible] notified on May 25. It [illegible] t June, reached epidemic [illegible] as the hot season drew to its close in September. The virulence of the disease abated considerably as the summer wore on, and the case-fatality, which had been 71% in June and July, was [illegible] occurs when an epidemic of any major disease is declining. The point was put neatly by one of my colleagues with Indian experience of the disease: "It doesn't matter what you do in the first three months, 70% of them will die; and in the last three months, if you feed them on Worcester Sauce, 70% of them will recover." The fatality for the 547 cases in 1938 was 55%. Many more men than women were attacked by the disease, but the fatality in the two sexes does not differ significantly. The fatality peaks are attained at the extremes of life.

CLINICAL FEATURES

The onset in cholera is usually sudden, the loss of fluid [illegible] hollow, the eyes sunken, the lips were often a little cyanosed, the fingers and toes were frequently shrivelled, the skin was inelastic, the tongue dry and centrally furred, the extremities cold, the nails blue. Their voices as a rule were reduced to a whisper—the vox choleraica—and they were not restless. Mentation was almost invariably clear, and provided cramps had not yet begun a history was usually obtainable. The important points in the history were when the disease had begun, when urine had last been passed, how many times the patient had vomited, and how many stools he had passed since onset. All patients were also asked whether they had been inoculated against cholera and whether they smoked or ate opium. The prognosis is impaired by opium addiction.

Treatment.—On admission the routine treatment adopted was as follows.* The axillary and rectal temperatures were taken and charted, rectal swabs were [illegible] 1/100 gr. of [illegible] blood-pressure [illegible] saline infusions were [illegible] saline [illegible] rectal [illegible] the temperature of the saline—and the rate of flow was gauged by the degree of dehydration present. The saline solutions used were normal saline, bicarbonate saline (gr. 160 to the pint), and 2% glucose saline. Kaolin in suspension and potassium [illegible] passed and the number of stools and vomits to be recorded. The importance of charting hour by hour and day by day the amount of urine passed in the reactionary stage of cholera cannot be over-emphasised. It is essential to have these urinary data kept up to the minute if a threatening anuria is to be successfully combated.

Anuria.—The two greatest dangers to life in cholera are hyperpyrexia during the reaction stage, especially after saline infusions, and anuria. The half-hourly charting of the rectal temperature during the infusion of saline and the application of ice-packs or rectal injection [illegible] disease; the factors whic[illegible] blood-pressure, the diminution in the minute-volume of the kidney owing to the increasing blood viscosity, and the hitherto unexplained fact that the kidney in salt-[illegible] than other physical types. The earliest signs of the onset of this condition are congestion of mucous membranes and conjunctivæ, malar flush, rambling speech, delirium, and a gradual increase in depth and rate of respiration. The condition, unless promptly treated, leads invariably to coma and death. It affords a clear [illegible] appear to be rational in attempting to overcome this anuria are the six-hourly infusion of 1000–1200 c.cm. of bicarbonate saline, the giving of hot rectal salines and cupping of the loins. I have seen a man remain completely anuric for over 50 hours and yet recover completely. During the anuric phase the blood-urea rises rapidly and may reach very high figures. The man referred to above had a blood-urea of 350 mg. per 100 c.cm. at the end of his anuric period. Recovery is heralded [illegible] turbid, high-coloured [illegible] by a "critical diuresis" [illegible] ases of acute glomerulonephritis. [illegible]

To sum up, the [illegible] laid in the treatme[illegible] must be made good [illegible] time the toxæmia [illegible] means. If this fluid loss is not quickly made good, the suppression of urine which invariably occurs in the stage of collapse may [illegible] uria leading to rapid death. [illegible] the systolic blood-pressure d[illegible] it is therefore one of the ai[illegible] to keep the systolic blood-pressure above that level. But if the restoration of the body fluids is brought about too rapidly the results are apt to be equally fatal, for this reason. Saline solution is being poured into the veins of a profoundly dehydrated and collapsed human being whose blood viscosity is about 1064–1070; his extremities are blue and cold; his rectal temperature may be anything up to 104° F. The circulation in the walls of his intestine has been in abeyance, if not absolutely, at any rate relatively, for many hours. The blood viscosity is rapidly reduced towards the normal figure by the infusion, the circulation is restored, and the immediate result is the absorption of a possibly lethal dose of toxin from the small intestine. That this is the course of events is shown by a study of the half-hourly rectal [illegible] nous infusions. [illegible] len, and should [illegible] ly ensue. Con[illegible] to prevent this disaster, and ice is much more useful in a cholera hospital than hot-water bottles. Truly did the early Anglo-Indian writers on this disease say that the reactionary stage was even more dangerous than that of collapse.

Rogers quotes Calcutta figures to show that over a certain period no recovery was recorded in Europeans whose temperatures rose above 103° F. in the stage of reaction. This statement is happily not true for Hong-Kong if one considers the rectal and not the skin temperature. There were five European cases of cholera in 1938 ; one died of anuria and right-sided cardiac failure, whereas the other four recovered, one after a stormy illness in which his rectal temperature rose to over 104° F. on several occasions.

Normal saline was chosen as the routine infusion, first, because hypertonic saline had not been conspicuously successful in 1937, judging by its mortality ; second, because it seemed that theoretically the main effect of hypertonic saline intravenously would be to induce a flow of fluid into the blood-stream and the only place in a choleraic body which could yield extra fluid would be the gut. This would mean that even more toxin would be absorbed and the subsequent reaction would be a violent one. To reduce this to a minimum, normal saline was chosen. Ride,[1] in a penetrating and masterly survey of some of the biochemical aspects of acute cholera, arrived at a similar conclusion, and I cannot do better than quote his words : "Until we have ascertained the chemical nature of the fluid loss it would be better and more scientific to attempt to make good the dehydration loss by normal saline infusions ; until we are certain what will do the most good it would be better to use that which we know will produce the least harm, and that undoubtedly is normal saline." Ride also stresses the paramount importance of early restoration of renal circulation and function ; his paper must be read in its entirety by those interested in the biochemistry of this disease.

Cholera sicca, the rarest type of the disease, was only seen three times in 1938. Two of the patients were children, the third was a young man. All three were desperately ill on admission. Cyanosis, hyperpyrexia and collapse were the outstanding signs, and one of the children, who had no diarrhœa, showed signs of free fluid in the peritoneum and shrivelled finger-tips on admission. Her temperature was 106° F. and this had to be reduced by the continuous application to the body of sheets wrung out of iced water. All these patients died, and vibrios were isolated from the intestinal contents at autopsy. Presumably in such cases the outpouring of rice-water fluid into the gut is so rapid that a paralytic ileus ensues, which accounts for the complete absence of diarrhœa.

Complications noted in this series, apart from the anuria, were septic parotitis in five cases, keratitis, boils, cellulitis, cholecystitis and various types of skin sepsis. Pulmonary conditions such as bronchitis and bronchopneumonia were not uncommon, but frank renal lesions were scarcely ever found. Many sections of kidneys taken from patients who had died anuric showed no gross microscopic changes—that is to say, the renal condition is one of functional depression rather than of structural change. One man developed and died of a right-sided pyonephrosis during convalescence, and another contracted fatal diphtheria after an attack of cholera. An interesting but unusual sequela of the disease is bradycardia. Several patients had a pulse-rate in the forties during their convalescence.

Differential diagnosis presents few difficulties in most cases, and sheer fright accounts for most of the mistaken diagnoses which were usually bacillary dysentery, gastroenteritis or food-poisoning. The two most interesting mistakes were a ruptured ectopic gestation and meningococcal meningitis with the rare so-called choleraic onset. In this condition the stools retain their fæcal pigmentation and in no way resemble the rice-water stools of true cholera. Two cases were seen in which bacillary dysentery and cholera coexisted.

Bacteriological examinations were made in 500 of this group of 547 patients. Rectal swabs were taken on admission and again during convalescence, and no patient was discharged until he had had two consecutive negative reports at an interval of a week. Vibrios persisted for remarkably long periods in some cases and this persistence was more commonly noted in children than in adults. One adult German took 31 days to become vibrio-free. The returns showed that 349 of these patients were vibrio positive, 151 vibrio negative. Some vibrio-positive cases were only found to be so on a second or third examination. Therefore 7% of all cases sent in as cholera proved to be so, while 30% were never proved to be suffering from the disease. There is little doubt that most of the 30% vibrio-negative group were really suffering from cholera, as nearly half of them died. The figures are given in the table.

Deaths				Recoveries			
Vibrio-	neg.	Vibrio-	pos.	Vibrio-	neg.	Vibrio-	pos.
M. 16	F. 26	M. 145	F. 66	M. 57	F. 22	M. 80	F. 58
Total 72		211		79		138	

M. = male; F. = female.

MEASURES OF CONTROL

In a group of 106 patients who stated definitely that they had not been inoculated, 39 died and 67 recovered—a fatality of 38%. In a group of 26 patients who said they had been inoculated in 1938, 3 died, giving a fatality of 12%. These small-group figures prove nothing. The lower-class Chinese, who suffer more than any other class from cholera, did not come forward readily to be inoculated against cholera, and they are extraordinarily shrewd judges of the value to be attached to the various prophylactic methods now employed in medicine.

The measures necessary to combat an outbreak of cholera include rigorous supervision of immigrants, however they arrive, by land, sea or air, immediate segregation and prompt notification of all obvious or suspicious cases, and tracing each case or cluster of cases to its source. By these means it is often possible to trace and eliminate early foci of infection, such as an isolated infected well. Measures controlling the sale of fruit, food, drinks and ice-cream in the streets become essential if the disease shows signs of spreading, and sensible propaganda can be of immense value in lessening the extent of an epidemic. The five points to be stressed in propaganda are :—

1. Boil all drinking water.
2. Eat no uncooked food.
3. Be inoculated against cholera.
4. Avoid purgatives of any sort.
5. Do what you can to lessen the fly nuisance.

For the treatment of the established disease it is desirable to have a fly-proofed building with stone floors which can be swabbed at intervals through the day. The various salines should be made up in bulk, and the few instruments necessary for tying in a cannula are kept sterilised and ready for use at a moment's notice. The most convenient and accessible vein is the internal saphenous just above the internal malleolus. All dejecta should be subjected for at least an hour to 10% 'Izal' or some similar antiseptic before being disp of, and care should be taken in planning the lay-out of cholera hospital to see that mortuaries are as carefull fly-proofed as wards.

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[1] Ride, L. T. *Caduceus,* 1938.

NATIONAL ASSOCIATION FOR THE PREVENTION OF TUBERCULOSIS

MASS RADIOGRAPHY

THE association's annual conference was held London on July 28, with the Duchess of PORTLAND the chair. Wing-Commander R. R. TRAIL pointed that early diagnosis is of little value unless followed b efficient treatment ; it is the aim of the new allowanc to facilitate such treatment. Tuberculosis is the m cause of death in the age-group 15–24 ; treatment of early cases would not only minimise this mortality bu in the long run would save the country money.—Surgeo Commander W. G. C. FITZPATRICK described the work of the Royal Navy with mass radiography, an mentioned the monotonous and tiring nature of th work.—Dr. P. D'ARCY HART brought out the diff ences between military and civilian surveys : amo civilians examination is voluntary, and a higher incid ence of positive findings is to be expected becau Service personnel have been selected. Patients al known to be tuberculous should be included in surveys, but they should have special consideration an there must be no possibility of the findings leading to victimisation. About 0 5% of those examined in a civilian survey would have to leave work for diagnosis and treatment, while 1–2% would need to be kept under observation, though able to remain at work. The difficulties to be overcome are financial (partly covered by the present scheme); the deficiency of sanatorium beds; the decision as to the best treatment of certain early cases; and the rehabilitation of sputum-positive cases.—Miss K. C. CLARKE, of Ilford Ltd, thought that quality is more important than portability in miniature radiography apparatus; the sets now being supplied can be moved quickly by three men. She did not agree that the work is monotonous, the personnel can exchange duties frequently.—Dr. F. R. G. HEAF urged that full facilities for other methods of diagnosis (tomography, bronchoscopy and laboratory services) should be available before mass miniature radiography is started Delay in diagnosis, after detection of an abnormality, may lead to invalidism. Change in environment, possibly by the introduction of prophylactic workshops and night sanatoriums, might diminish the need for treatment beds. Infected people should be regarded as workers, not invalids.

A different use for the mass radiography sets was suggested by Dr. C. H. C. TOUSSAINT. Half the deaths from pulmonary tuberculosis occur within a year of notification, these are acute cases of rapid onset. One X-ray examination will be of little use in detecting such cases, so that the present scheme is inadequate. A better scheme would be to secure the cooperation of general practitioners, by offering free X-ray examination for any of their patients in whom a suspicion of chest disease has arisen. By adopting this idea the tuberculosis officers of Bermondsey and Southwark had detected 2 8% of active cases among those X rayed. This work had been done with full-size films, but this would be the [illegible] sets.—Dr. E. K. PRIT- [illegible] outhwark, supported Dr. [illegible] suspect they are tuberculous may not present themselves for radiography, but those who have symptoms will readily come for X-ray examination if advised by their family doctor.—Some of the later speakers discussed the reactions of workpeople when a survey is proposed in their factories. An important point is that when a confirmatory examination on full-size film is required this should be arranged for in confidence.—Major PETER KERLEY maintained that the opposition to mass radiography is based on exaggeration of its difficulties In the control of tuberculosis lack of sanatorium accommodation is the real problem He did not agree that most cases are acute with rapid onset, cases found to have positive sputum often have no symptoms.—Dr. HARLEY WILLIAMS spoke of the necessity for intelligent propaganda as a preliminary to mass radiographic surveys.

ALLOWANCES

In opening the discussion on the new financial allowances for the tuberculous Mr. ERNEST BROWN, Minister of Health, said that the deaths from tuberculosis in the third year of this war have been less than half those in 1918, but we must not forget that the mortality from tuberculosis is an index of past rather than present [illegible] his giving up work. The scheme of allowances, which ensures that patients can afford to give up work, involves an entirely new principle, for in effect it supplies benefits for the patient's dependants. It is essentially a public-health measure, and not a kind of glorified public assist- [illegible] has been [illegible] anomalies [illegible] above the [illegible] ne facilities [illegible] Exchequer [illegible] ng. Allowances are to be restricted to pulmonary cases because these are likely to respond to early treatment while earning capacity is but little impaired, and because these patients may continue at work and infect others Neither of these considerations applies to non-pulmonary tuberculosis

Dr. J. B MCDOUGALL maintained that chronic cases ought to receive the allowances, if only to protect the general public from infection. It is difficult for tuberculosis officers to decide whether a case is chronic and therefore ineligible —Mr. J L. SMYTH, secretary of the social insurance department of the TUC, pointed out that the allowances only provide minimum subsistence for patients compelled to give up work, and are not high enough to act as an inducement to those who need early treatment but still feel well.—Dr. G. S JOHNSTON and others agreed that difficulties will arise from the exclusion of chronic and non-pulmonary cases, and that the allowances are too low —Mr. T. LINDSAY, principal assistant secretary to the Ministry of Health, explained that the allowances are restricted in amount, and not given to chronic or non-pulmonary cases, because they have been introduced under emergency powers. These powers permit money to be spent only on services connected with the war—for example, to promote recovery of working capacity. A more extensive scheme would require special legislation leading to delay Relief for the chronic case unlikely to regain his working capacity would not be a war service. Extension of allowances to chronic cases might, however, be considered on the ground that such patients are a source of infection

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In England Now

A Running Commentary by Peripatetic Correspondents

I AM frankly puzzled about this social biology scheme for tackling the problem of promiscuity, and its corollary of venereal disease, in war-time. Its promoters seem to think that it is only necessary for a "training-scheme" to be offered to the young women haunting the streets and flats and dock sides for them to abandon their gay life and huge money takings and become reformed characters. Committees working for the British Social Hygiene Council propose that women who need definite medical and psychiatric treatment *before they are capable of adjustment to industrial life* should be directed to special training centres, with hostels attached, attended by physicians and psychiatrists from regional EMS hospitals. This scheme would apparently combine a group of women who have failed in industry because they need psychiatric treatment with a group who cannot be employed because they are deliberately promiscuous. To say that "biological causes" are involved in both cases means to me nothing at all. Who are these promiscuous women? Some are impudent hussies who have declared themselves as "prostitutes" on registration; others have been called up but have behaved so outrageously that neither the Services nor factories can tolerate them.

I do not see what this scheme has to offer that has not been tried already. What "therapeutic occupation" can be offered to console a young woman who has been dragged away from earning £30 a week in the Charing Cross Road I cannot think. It is not clear how "skilled diagnosis" is going to help, for no evidence is given to support the belief that many of them are in some way subnormal or [illegible] departments [illegible] Labour regard [illegible] as so few that [illegible] about Ministry officials have no power to control conduct or insist on treatment, no expert staffs to run experimental centres. The Ministry of Health also say they [illegible] glad [illegible] clubs [illegible] them to ask for further compulsory powers on health grounds. The Home Office and the police say they can do nothing within their existing powers. I think myself they could do much to clean up the streets, but not while they are uncertain whether they have public opinion behind them. No constable is going to risk his career by enforcing unpopular regulations if he is to be ruined by a mistake—or even the suspicion of a mistake.

But if we really want to discourage promiscuity we cannot allow public places to be used as open markets. Young girls are encouraged to take up evil ways when *they see older comrades earning big money under the* very eyes of police and public who make no sign of disapproval. The encouragement to the potential customer is equally obvious.

* * *

To make any plan for London would be a great achievement. To have provided a practical one which incorporates such stuff as dreams are made of was a greater. Mr. J. H. Forshaw and Prof. Patrick Abercrombie in their *County of London Plan* (Macmillan, pp. 188, 12*s.* 6*d.*) have also shown us how to set about carrying it out. What is Planning? Thinking ahead. To think far enough but not too far. To think as a whole and yet in bits. This new London will not arise at the stroke of the magician's wand, but by the sweat of brows, the agonies of thought, the spirit of compromise over half a century. The men that built our cathedrals thought ahead. The men that planted oaks thought ahead. And then came the time of economic returns; and the jumbled heap of murky buildings was the result and soft woods were planted that a man might see his return before he died. Now again we begin to think ahead. Mr. Forshaw and Prof. Abercrombie can never see the realisation of their plan. They must be content if they see their first period well on the way. They should die happy if they see the second one begun.

Who is a Londoner? There are those that were born and bred here. There are those that come from all the world to earn their living here and return whence they came. And there are those that come from Liverpool and other parts of the North and West to rule and govern us, to minister to our immediate needs, and to organise for our future ones. The authors of the plan, themselves in the third category, have wisely recognised this in their division into London *the Community*, London *the Machine*, and London *the Metropolis*. In the governance of London the multiplicity of function has always been a factor of difficulty. This is not diminished when we remember that we are not only the metropolis of a country but also of an Empire, and every man and woman in that Empire has a right to a say. It is a pity that the City still stays out, unless the rulers of that area have definitely decided to plan it as a relic of a bygone medievalism. Nor can we think of London only as being within the County area. We must take into account the London *Sprawl* of 1943, as indicated on the dust cover. It is fortunate that one of its authors is also adviser of plans for both these other areas—the kernel and the husk.

Where does medicine come into the plan? Into every word of it. There is the hygiene of the home and the hygiene of the place of work. There is also the hygiene of the travel to and fro. This is a matter that has hardly been touched as yet; but upon it may depend in peace the further evolution of our state, just as in war the success of an engagement will depend upon the hygiene of the march. And so as doctors we are interested in the roads and the railways and the waterway of London, not only as human beings, but also that sore feet or fatigue may not interfere with efficiency at work or enjoyment of leisure. The engineers will deal with this. What more specially concerns us? It is a law of nature that all living organisms die from accumulation of products of their own activity, unless these are removed by nature or by art. Sanitation must come first. There is no mention of sewers in this report. Maybe that is being kept for a more private communication to the council; but it is well to remember that upon the sanitary engineer depends the success of all enlarging communities. Surface refuse comes from two sites—the market and the house. Of the former the plan takes account, the latter is outside it. Ventilation comes next, and in this the plan is sound, for open spaces are a matter of ventilation and a big factor in the prevention of slums. The whole plan is based upon the urgency of space for the unit of population—that is, the individual. But it is no use providing air if persons are allowed to foul it; "further research is necessary into the question of atmospheric pollution"—aye, and powers to prevent it. With ventilation may be linked the sun and air bath, and while our planners have not forgotten this they have been all too chary of swimming pools. Instance the development of the South Bank area—one of the high spots of the plan. But County Hall alone would more than fill one in the lunch hour of a July heat wave; and within the stretch thence to Southwark Cathedral there is need for two if not for three.

The problem of hospitals they leave as "largely a matter for the council and medical authorities to decide." Not too good, for neither of them can give unbiased views. The council is the owner of the majority of hospitals. In the interest of the county we can no more refrain from moving hospitals than from moving Waterloo station south or from putting Charing Cross underground. The "medical authorities," whoever these may be, think in terms of municipal and voluntary systems. We have to think of hospitals in terms of usage by the people, and what they want is a hospital nearby for the daily needs of illness. This was not so at the beginning of the century. For ordinary illnesses people stayed at home; they went into hospital to have something done or because they were suffering from some grave or rare disease. Now we take them in to see whether we can avoid doing anything with the knife and to discover whether they may be in the early stage of some disease while it is still curable, and most people have to go to hospital whenever they must stay in bed for more than one day. Modern accommodation and domestic economy do not allow of illness being cared for in the home. Everything other than these three needs may go to special hospitals which may be "centralised" or "decentralised"; the land alongside the "B" ring-road may be suitable for them. But for the hospital serving the daily life of the community—including childbirth—there is one place and one place only, and that is near the people's homes. It must be accessible, not "by road, rail or air," but by Nature's method of foot-slogging or carried in mummy's or daddy's arms.

And so we need a hospital for each unit of the population just as much as we do a school. The unit will be larger than those chosen for schools—perhaps five, ten or twenty times as large. When it is decided how big a hospital is economic for the daily needs of the people without doing special work, we shall need an addendum to the plan. This should allot a hospital for the daily needs of the people to each unit of population. It may be fitted in either to the Social and Functional analysis (coloured plate 1) or to the Development and Zoning plan (coloured plate 12). If there is already a hospital within the area of a given unit it does not matter whether it be under municipal or independent control so long as it is efficient. If there be no hospital in this area one should be built and an old organisation moved into it or a new one formed. If there is more than one hospital in a given area the most suitable should be allotted for this purpose and the others reserved for special work or pulled down. But no plan of London can be considered complete without the establishment of such hospitals. Perhaps the survey of hospitals that is at present being carried out will give it us. If it does not we must Mr. Forshaw and Prof. Abercrombie to return to a t for which they have already earned the gratitude everyone in the Empire.

* * *

Some years ago when I was on a visit to the May Clinic and had whiled away an afternoon in their publ health museum it occurred to me how little in me we make use of mass psychology, and the idea of t decoy patient came to me. Even those masters technique, the orthopædic surgeons, with their suppor ing cast of registrars and assistants, have never though of this. We could plant in the waiting-hall outsid outpatients carefully selected recovering cases, or, the case of midwifery, normal experienced multipa who would allay the nervous primipara's fears by attitude of cheerfulness and calm instead of telling th the horrible Freudian stories they usually hear.

* * *

Brown rocks, blue sky, a white-rimmed violet sea,
Grey houses, slabs of pink and gold and mauve—
Flowers on ancient walls; down cobbled street
Fish-smelling folk, wind-tanned, unwoolworthed smiles
These are the clear-cut cameos that greet
My grateful eyes in these thrice blessed isles.
(The sea always inebriates me; in the Scillies doubly

Letters to the Editor

SWABBING OF CONTACTS IN DIPHTHERIA

SIR,—I share the surprise of "Pathologists" (*Lancet*, July 17, p. 87) at two statements in the memo which you published on July 3 [illegible] t in special cir[illegible] those showing [illegible] statement that the child with a healthy nose and throat is not likely to harbour the KLB for more than a brief period. There is undoubtedly much difference of opinion as to what constitutes a healthy nose and throat in a child; and in consequence, if the policy of the memo is followed, there is likely to be great variation in the number of contacts swabbed by different workers.

In a large urban community, with many possible sources of infection, action taken on the results of swabbing close contacts may fail to prevent the spread of the disease; but the general recommendation to neglect swabbing of contacts ignores the results of observations made in smaller or isolated communities where the sequence of events in an outbreak can more readily be traced. We have had recent experience of three small outbreaks which bear on these points. In the first, which involved successively three neighbouring [illegible] and carriers were removed to hospital, where they were kept until three successive negative swabs were obtained. No further cases have been notified in this town in the [illegible] ht months. Although the [illegible] ed no obvious abnormality [illegible] tract, the duration of the carrier state was 22, 41, 60, 62 and 79 days. In the other two outbreaks swabbing of the household contacts was not carried out immediately after the first cases occurred. In one instance there were 6 cases, 4 fatal, and the interval between the first and the last case was 23 days; in the other household 3 cases occurred over a period of 14 days. In these two outbreaks 5 carriers were detected after the last cases were diagnosed.

In these last two outbreaks cases occurred irregularly and the interval between cases precluded direct case-to-case infection: early swabbing [illegible] would have [illegible] the further spread of the disease.

To neglect swabbing of the contacts of cases of diphtheria, as recommended in the memo, will undoubtedly lead to much avoidable illness and regrettable tragedies.

Cambridge. A. W. DOWNIE.

BACK TO LISTER

SIR,—Mitchell and Buttle (*Lancet*, 1942, ii, 416) have discovered proflavine, and incidentally Lister's antiseptic method unaware. Cheatle (*Brit. med. J.* 1900, ii, 8) tells us that Lister supplied him with a quantity of the double cyanide of zinc and mercury from which he made a paste with 1 in 20 carbolic lotion. With this he smeared his fingers and the skin around a wound and [illegible]ed up the wound, still using his fingers, and he then applied the first field dressing. Of the wounds he was able to follow up all healed with a dry scab. Cheyne wrote: "For ages, those who practised surgery were constantly confronted by the [illegible] to make the flesh [illegible] e of leaving the wound [illegible] ve all agencies which [illegible] aling" (*Joseph, Baron* [illegible] Edinburgh, 1927). Lister [illegible] ised the use of an antiseptic at the first dressing but [illegible], as it would then be included among the agencies that might hinder healing. By smearing the skin around the wound Cheatle began to apply the principle of antisepsis—the exclusion of secondary infection—just smearing, covering with an antiseptic dressing and drainage for twenty-four hours or so. After this, dressings would be infrequent.

In your leading article accompanying Mitchell and Buttle's paper (p. 430) you say: "The introduction of the powder directly into the wound seems to be more logical than the time-honoured method of laying on, or lightly packing in, a piece of gauze wrung out in a 1 in 1000 watery or oily solution, of which over 90% [illegible] retained [illegible] truth. [illegible] in some [illegible] material under a raised scab and rightly concluded that it was coagulated serum, the pabulum for fibroblastic growth which Lister warns us against [illegible] r he also [illegible] ed cases. [illegible], confirming his belief in the inhibitory powers (he was the first to use the word inhibitory in this sense) of the tissues.' Proflavine is said to be less toxic than acriflavine; it is to some extent toxic because soluble. Double cyanide of zinc and mercury is one of the rare insoluble double salts and is therefore not toxic. From this mixture of salts—for it is not [illegible] e double salt—Lister made his [illegible]. Today this is not made, un[illegible] ding to his final directions and [illegible] nd irritating and not strongly [illegible] (Halford, A. C. F. *Aust. J. Pharm.* Dec. 20, 1929) and so has fallen into disfavour. I suggest a perusal of Lister's method of wound management—"the principle that shall guide the practice of surgery." So quod vide and vale.

Brisbane, (Lister's Birthday). A. C. F. HALFORD.

COLLAPSE UNDER PENTOTHAL SODIUM

SIR,—Dr. Hoenigsberger's article of July 3 raises the possibility that mishaps with 'Pentothal Sodium' may not be as few as the published reports suggest. Recently I had two similar cases, one of which ended fatally. These two cases, which were seen within a week of one another, were the only ones which have caused us concern in a series of many scores in which intravenous pentothal sodium has been employed for the reduction of fractures in otherwise fit members of the Forces. In [illegible] e more resistant to any [illegible] ilian.

[illegible] (5%) is always prepared [illegible] before use and injected slowly while the patient counts at the rate of about 1 every 2 seconds. Counting usually stops—that is, consciousness is almost lost—at between 20 and 40, when 4–8 c.cm. of solution have been given. After an interval of a minute a similar amount is injected at the same rate. A clear airway is always maintained.

CASE 1.—A soldier, aged 35, was admitted with a simple fracture of the right tibia and fibula [illegible] shock. No morphine or other general treatment was [illegible] ission, without [illegible] a 5% solution [illegible] ather abruptly [illegible] his colour was good. After a minute a further 7 c.cm. was slowly given and the patient's condition appeared to be in no way unusual. Five minutes after the [illegible] fracture was being man[illegible] The face was pale, but the [illegible] contracted. The pulse was rapid, weak and irregular. Artificial respiration and the administration of oxygen from a Boyle's apparatus were not successful in restoring breathing. Within 3 minutes of the onset of symptoms the pulse was imperceptible, heart sounds became inaudible and the pupils dilated. Meanwhile he was given an intracardiac injection of 2 c.cm. of nikethamide, and an intramuscular injection of 2 c.cm. of 1/1000 adrenaline solution. Artificial respiration was continued for 10 minutes, but was unsuccessful.

Autopsy revealed no pathological process in any organ, and the pathologist reported death as being due to barbiturate poisoning.

CASE 2 occurred a week after case 1. A spinster, aged 64, suffering from bruising, superficial abrasions and a simple fracture of the lower end of the left ulna was admitted as an air-raid casualty. She was very shocked, but had had no loss of blood. Her general condition was treated, and during the first 24 hours she received 2 pints of glucose saline and 2 pints of plasma by the intravenous drip method. Ten days later, when her condition was satisfactory, it was proposed to manipulate the fracture. Her previous medical history was negative. She had a moderate degree of arteriosclerosis, but no abnormal signs in heart or lungs. The urine was normal. No preoperative injection was given. After the injection of 2 c.cm. of 5% solution of pentothal sodium, at a count of 8, breathing suddenly stopped and the patient was unconscious. The pulse was 120 per minute, regular and of fair volume. The pupils were contracted and the face was pale, but there was no cyanosis. After a minute of artificial respiration the breathing re-started, the pulse dropped to 90 per minute, and a good colour soon returned to the face. She was unconscious and sufficiently relaxed for the fracture to be reduced and put into plaster. She regained consciousness an hour later and her further progress was uneventful.

In neither case were there any of the recognised contra-indications to barbiturate anæsthesia, and thinking of them in retrospect I see no way in which a repetition of these incidents might be avoided.

Cardiff. W. H. HARRIS.

SEDIMENTATION IN TUBERCULOSIS

SIR,—I do not wish to belittle the value of any serial observations on patients suffering from chronic tuberculosis, but Dr. Day's article of July 24 may do more harm than good if he convinces your readers that he has found a simple guide to progress in tuberculosis. Alas, there are no short cuts to knowledge as to how the complex human organism reacts to a chronic disease process. As I wrote in the current number of the *Practitioner*:

> ". . . an increased rate of sedimentation in pulmonary tuberculosis can be considered of clinical significance only when it is correlated with all the clinical and radiological data, and with simultaneous determinations of plasma-protein content (by an accurate chemical method), plasma viscosity, refractive index of the plasma (permitting a rough estimate of the albumin-globulin ratio) and a complete blood-count, including a Schilling or Arneth differentiation of the polymorphonuclear cells. As facilities for such a complete investigation are rarely available in sanatorium or dispensary practice, the test is of doubtful utility in this condition."

Much more accurate hæmatological and biochemical work should be carried out, as a routine, on all sanatorium patients. The value of such findings, in close correlation with the clinical and radiological findings, would be inestimable. In the absence of facilities for such work, the educated senses of a good clinician provide a better guide to progress than laboratory findings; isolated laboratory findings expressed with the authority of mathematical accuracy may even interfere with clinical judgment.

Finsbury. E. OBERMER.

CETAVLON AND SKIN INFECTIONS

SIR,—The detergent and antiseptic properties of 'Cetavlon'[1] described by Barnes,[2] suggested a trial of this chemical at an EMS hospital in two skin wards occupied by soldiers, many of whom had streptococcal or staphylococcal skin lesions.

The two wash-basins and two baths in each ward were formerly cleaned with an abrasive soap 'Bon Ami' or with 1 in 20 carbolic acid swabbed over after cleaning with soap. After cleaning in this manner it was usually possible to grow coliforms, proteus, streptococci or staphylococci in cultures from the basins. This was not surprising, for they were likely to be greasy with the ointments used on patients, and their surfaces were worn and had cracks in the glaze. A 2% cetavlon solution removed dirt and grease rapidly, and was approved by the nursing staff. Subsequent cultures showed the [illegible] sterile, and the method appears effective for preventing cross-infection.

Cetavlon was also found useful for cleansing the skin of ointments, and for the removal of scabs and crusts from impetiginised areas or where there was widespread dermatitis or eczema. In the initial experiments two patients with generalised boils were washed down with 1% solution daily, and the skin rinsed and dried. One of them had also an area of dermatitis due to strapping Both cleared in ten days. In such cases cetavlon readily removes dirt and grease and reduces the staphylococcal population of the skin; the natural bactericidal powers of the skin should then suffice to deal with the infection. A case with severe nummular eczema which had had two relapses (sensitisation to flavine being suspected), a severe chronic infective dermatitis, and cases of impetigo of the face were cleaned once or twice daily with cetavlon and progress was satisfactory. Absence of the [illegible] involved when oil or soap and water are used must be importance in the treatment of inflamed and infect skins.

There is no doubt that some individuals show [illegible] ance, but the work of Williams et al.[3] indicates that [illegible] proportion is small. However one of our cases of [illegible] petigo of the face developed moderately severe [illegible] after the use of cetavlon twice daily for six days [illegible] remove crusts. Two other patients, with gener [illegible] impetigo, complained of dryness of the skin, but [illegible] application of cetavlon was continued and no dermati [illegible] attributable to its use could be detected at the end of [illegible] week.

My thanks are due to Sister G. M. Jones and the staff of [illegible] ward, to Dr. Bodoana [illegible] of the LCC pathological department [illegible] carrying out the cultures, and to Imperial Chemical [illegible] Ltd. for supplies.

Devonshire Place, W.1. L. FORMAN

FUTURE OF RADIOLOGICAL PRACTICE

SIR,—In view of the probability [illegible] that a comprehe [illegible] medical service may be introduced by the Gove [illegible] me when it is generally felt that the time has co [illegible] rests of steps should be taken to safeguard the inte [illegible] radiologists in such a service. We there [illegible] medical radiologists to a mass meeting to be [illegible] Saturday, Aug. 7, at 11 A.M., in the Reid-Kno [illegible] 32, Welbeck Street, London, W.1, when [illegible] interested in the future of radiology will have [illegible] tunity of expressing their views.

R. E ROBE
J. DUNCAN

COAGULASE-POSITIVE STAPHYLOC

SIR,—Referring to the article on the slide [illegible] Cadness-Graves et al. (*Lancet*, June 12, p. 736 [illegible] interest to note that during a similar investi [illegible] this laboratory the chief source of error was [illegible] be false positive results, given by about 10 [illegible] pathogenic *albus* strains, which persisted [illegible] and seemed to be due to agglutinins. No fal [illegible] reactions with *Staph. pyogenes* were record [illegible] Hirschfeld has shown that this clumping ph [illegible] is due mainly to the prothrombin fraction of t [illegible] and that no clumping at all occurs with pur [illegible] solutions. Unfortunately the preparation [illegible] gen-free prothrombin solution is not a sim [illegible] for a routine bacteriological laboratory, an [illegible] the test of its simplicity. The substitutio [illegible] however, by a prothrombin-fibrinogen solu [illegible] improves the specificity of the test and t [illegible] prepared solution is, in many ways, more c [illegible] than plasma. The reaction is remarkably [illegible] but varies with different strains, and its [illegible] nature appears to be roughly parallel wit [illegible] taken to coagulate plasma. Birch-Hirschfe [illegible] shown that the agglutination and coagulatio [illegible] seem, to a certain degree, to be independent [illegible] high concentration of sodium chloride (ab [illegible] tends to inhibit agglutination but not co [illegible] while coagulation does not occur with high d [illegible] prothrombin-fibrinogen solution when agglut [illegible] still obtainable. Fresh young cultures are [illegible] reliable and those grown on blood agar appe [illegible] stronger reactions than those of the same or [illegible] plain agar. The reaction is not affected by anti-coagulants and the chief sources of error associated with the tube coagulase test are obviated. The test has been found to be particularly convenient and dependable in routine work, providing the precautions stressed by Cadness-Graves and his co-workers, regarding the mixing of the bacterial growth and fluid, are observed. Details of this investigation will be published elsewhere.

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[1] Cetyl trimethyl ammonium bromide, Imperial Chemical Industries Ltd. Formerly called 'CTAB.'

[2] Barnes, J. M. *Lancet*, 1942, i, 531.

[3] Williams, R., Clayton-Cooper, B., Duncan, J. McK. [illegible] E. *Ibid*, 1943, i, 522.

West Riding Public Health Laboratory, Wakefield.
R. HODGSON, FIMLT

Parliament

ON THE FLOOR OF THE HOUSE

MEDICUS MP

JULY 27, 1943.—Mr. Winston Churchill announces the end of Mussolini's long and severe reign over the Italian people to a crowded and cheerful House of Commons. The date is worth noting because events move so rapidly that it is well to measure these things from a fixed datum line. The base line for the Axis, however, was July 19 when Hitler and Mussolini met at Verona and Mussolini came away empty.

These vast changes bring us nearer the relief and ehabilitation of enemy and enemy-occupied territory [illegible] must be and is being kept in mind." He added that we all have to share what we have with our less fortunate neighbours on the Continent and that there would be me measure of restriction on home consumption and me direction of our exports would continue to be ecessary in the early days of peace.

[illegible] Hudson opened his review of agriculture by paying [illegible] to the recent conference on world food production at Hot Springs, Virginia. "One of the most [illegible] facts which emerged from that conference was [illegible]eral agreement that immediately after the war [illegible] would be faced with an acute shortage of [illegible] Because of this agriculture will have to remain [illegible]bilised for some years. There will be not only a [illegible] of livestock, oils and fats but also of bread [illegible]d rice. This is the first time that a shortage of [illegible] has been prophesied by a member of the [illegible]sent, and it is significant of the realisation that [illegible] hand for food will come not only from Europe [illegible]sia but also from China and other parts of the [illegible]. "Therefore we may say with confidence," [illegible] Hudson, "that at all events the first two years [illegible]stilities have ceased will be years of great [illegible] on the food front." To meet this stringency [illegible] to maintain our present production for the [illegible] get some slight increase of our tillage area, [illegible] have got nearly all we can in that direction. [illegible] can increase, Mr. Hudson thinks, is our live[illegible] we must rear more calves and increase the [illegible] our sheep and breeding sows.

[illegible]st two days of the week the House discussed [illegible] paper on education, on which a bill will be [illegible]resented to the House later this year. The [illegible]ied out in the white paper envisages the [illegible]ing age raised to 15 and later to 16 on [illegible]

[illegible] the compromise on the religious instruction [illegible] which threatens to become a very hotly [illegible] issue. On the first day of debate only one [illegible] called attention to the physical aspect of [illegible] and called for a service providing school [illegible] every child in every school irrespective of the [illegible] the parents. The same member called atten[illegible] sentence in the white paper which states that [illegible]omprehensive national health service is set up [illegible] no longer be necessary for local education [illegible]s to provide treatment, and their functions [illegible]onfined to providing medical inspection . . ." [illegible] away the school clinics which have long done such admirable work would be a great mistake and the President of the Board is not likely to allow it. But the wording is unfortunate. So too is the wording of the paragraph dealing with handicapped children which says merely that part V of the Education Act of 1921 which makes provision for these children "will require substantial modification." Perhaps this issue is also to be relegated to the time when Assumption B of the Beveridge report is implemented. The House is getting into a bad habit of passing the buck to the medical profession, without giving the profession the necessary tools to do the job.

FROM THE PRESS GALLERY

Making Milk Safe

IN the House of Lords on July 27 Lord ADDISON called the attention of the Government to certain aspects of food policy, with special reference to milk and milk products and their cleanliness and safety. He welcomed the Government's white-paper on milk policy as a great organised step forward. The state was going to see that this vital food not only became more popular but was also wholesome, and it was sensibly tackling the question in the [illegible]w. Lord Addison felt su[illegible] a few years before the [illegible]ld be immensely improved. But so long as there was a considerable proportion of milk which was not bacteriologically of the right standard it was for the Ministry of Food to see that it was made wholesome. The method proposed in the white-paper was "heat treatment," which meant, he supposed, pasteurisation or sterilisation. Speaking as a medical man he thought that a great deal of nonsense had been talked about damaging milk by pasteurising it. A child would benefit by [illegible]er than none at all. The [illegible] unanimously found that [illegible]ing pasteurised, and some [illegible]e same conclusion with, he [illegible] If there were some trivial [illegible], that could readily be made good.

MINISTRY'S MEDICAL ADVISER EXPLAINS

Lord HORDER was on the whole satisfied with the policy outlined in the white-paper but he reminded the Minister that time was of the essence of the contract. He welcomed the joint responsibility of the ministers of Agriculture and of Food for the distribution of clean milk—which he likened to the double security of two trustees signing a cheque. But there was one exception to the satisfaction which medical men and women felt with regard to the safeguards. He believed that much accredited milk was not obtained from tuberculin-tested cows, and if that was so, why should it not be an offence to sell such milk unpasteurised? Although the Ministry of Agriculture was taking over the supervision of the conditions of milk production Lord Horder hoped that the local authorities would still hold a watching brief for the consumer and continue to take samples, especially of milk supplied to nurseries, schools, and canteens. There should be bacteriological tests as well as tests for keeping qualities. It was an anomaly that in this year of grace 1943 this nation should purvey, the Minister of Food condoning, a basic article of food knowing it to be a germ-spreading medium and knowing that the position, owing to difficulties of distribution, was worsening rather than getting better. Lord Horder supported Lord Addison's plea that the milk position should at last be cleaned up. It was not true that the medical profession were divided; there was as complete unanimity in the profession on this point as on any question in a free country like ours where a few folk will always take pleasure in showing their freedom by differing from the great majority. There was a note of drama about tuberculosis, Lord Horder continued, which tended to lessen the significance of other diseases spread by germ-laden milk, but, taken together, [illegible] prevalence and mortality must far outweigh those [illegible] to tuberculosis. There were two way[illegible] milk safe. The first was to ensure [illegible] cows were free from disease and that [illegible] collection and distribution were [illegible] to pasteurise the milk. Both ways were good, and they were not incompatible. But the long-term policy alone was not enough. It would take several decades before anything like complete cleanliness was effected at the cow end. Meanwhile more must be done to encourage intelligent men and women to enter the ranks of veterinary science. A third method of making milk safe for consumption was by boiling, but boiled milk should not be given to babies for two reasons. First, boiling lowered its nutritive value, whereas pasteurisation did not. Secondly, to warn mothers not to give milk to their babies unless it was boiled was to stigmatise milk, and thousands of women would not give it to their children at all. In face of this the Minister of Food had wisely decided to pasteurise bulked milk. True, pasteurising plants needed steel, but since we release steel in large quantities for the destruction of life it might not be a bad thing to release a little for the preservation of life. He believed the public was sufficiently educated to prefer safe milk to milk "straight from the cow." The cover offered the small producer-retailer who might be affected would, he thought, satisfy even Lord Beaverbrook. If pasteurisation led to the *shutting down of some of the dirtier milk handling and* distributing premises so much the better for the community. No subsidy could be better spent than in protecting the citizen from a danger that has been in our midst far too long.

Lord TEVIOT, speaking as a convinced opponent of tampering with food, saw no justification in embarking on a pasteurisation scheme without a great deal more research and asked for a drastic policy of cleaning up dairy herds, particularly bulls. Lord HANKEY paid tribute to Lord Woolton in the words of Cicero—in nothing do men more nearly approach the gods than in giving health to men—but admitted he was uneasy about accredited milk. Lord DE LA WARR pointed out that one of the main limitations in improving our milk-supply was the need for an adequate water-supply on the farms.

MINISTER'S REPLY

Lord WOOLTON said that in London 96% of the milk was already pasteurised, in Manchester 85%, and in Glasgow 70%, and in areas of over 10,000 population 65%. It was estimated that within the next few months the amount of pasteurised milk in these areas would be increased by another 15%, and in eighteen months the whole of the country would be covered by rationalisation schemes. The problem was to get new plant to deal with the increased quantity of milk. As a broad statement, the rationalisation schemes would deal with all the places where bulked milk was distributed. He did not know whether he could secure that no TT milk was bulked, but he would try to direct it to the large centres where children should have it, or where it would be purchased as TT milk. In formulating his milk policy Lord Woolton had consulted Lord Horder, the Medical Research Council, the BMA and the Royal Colleges of Physicians and Surgeons. Indeed he had taken so much advice he wondered that he had produced a white-paper at all. He assured Lord Teviot that though he did not claim that pasteurisation gave immortality, he refused to admit that it does any harm to milk. Lord Teviot's conception of dead germs floating in pasteurised milk and rising to life again in the human body was sheer scientific nonsense. Lord Woolton agreed with Lord Horder's suggestion that even within the limitations made there was a danger of tubercle from accredited herds, but if they had waited for agreement on perfection before bringing out the white-paper they would have had to wait a long time. The Minister of Agriculture and he knew only too well the mechanical hindrances to getting more milk treated during the next eighteen months owing to the demands of the war for the machinery involved. But they hoped Lord Horder would not think they had been half-hearted. He was confident that the steps laid down in the white-paper would benefit the health of the nation long after the war was over.

Workmen's Compensation

The HOME SECRETARY informed Mr. ARTHUR GREENWOOD on July 28 that the Government had had under consideration the claims put forward from various quarters for increasing the rates payable under the existing Workmen's Compensation Acts and after lengthy discussions with the Trades Union Congress and the British Employers Confederation had decided to subm to Parliament a bill embodying certain increases. The increases were intended to be of a temporary nature and were without prejudice to the introduction of a revised scheme of workmen's compensation which the Government had under consideration in connexion with the Beveridge report. Later the bill was introduced and read a first time.

Artificial Insemination

In the House of Lords on July 28 Lord BRABAZON drew attention to the immediate consequences to our livestock of applying recently gained experimental knowledge of insemination, and to the potential results for the human race. Having achieved the highest economy in running the mammalian body as a he engine Nature in her wisdom had thought fit to ensur survival of species by mass assault—to the tune o 3000 million sperms per coitus in the stallion, where onl one was needed to fertilise the ovum. We in ou could trap the surplus and insert it efficiently into oth mares. *By this practice a bull could put ten cows* i calf instead of one; in Russia from one ram they ha got over 2,700 ewes in a year. The sperms of a stallio lasted no more than twelve hours; bull's or ram could be kept for a week. In future we might exp sperms rather than animals. To avoid the dangers o in-breeding (which had already spoilt the stock of k and Irish terriers) the Jockey Club allowed no thorou bred to be inseminated except by the covering stallio Passing to the human side, from "insemination" "telegenesis" (which means the same), there had b he said, ten thousand applications in the USA for semination by an unknown father from wives wi sterile husbands. Such progeny, looked upon by th public as legitimate, was in fact illegitimate. Th there were women who would like to have child without marrying. In face of these new forces we mu direct them so as to bring happiness and good into t world.

Lord GLENTANAR insisted that little was known yet about the ultimate results in animals of th unnatural practices.—Lord MARLEY hoped that the n approach might be the means of ridding us of the te "illegitimate" as applied to offspring.—Lord BLEDIS remarked that there was nothing new about the artifi insemination of livestock. In New Zealand, wh economic prosperity was bound up with the dairy industry, it had the encouragement of Governme An official report had calculated the production in season from one outstanding bull of 600 daughte capable of providing 150,000 lb. of butter fat valued £10,000. He would like the supply of semen to accelerated so as to replenish the livestock in dev countries.—The BISHOP OF CHICHESTER drew a distinction between insemination in man and mammals, endorsing Aldous Huxley's warning of fearful calamity of a purely mechanical world so human beings are concerned.—Lord SEMPILL also lo with alarm upon the advent of these scientific ideas the realm of human reproduction.

Replying, the Duke of NOR[illegible] that the Ministry of Health was [illegible] insemination from the human side. If and when aspect became a live issue no doubt the Lord Chan would be consulted on the legal problems it raised. the animal side it was certainly no new thing, Arabs bred their horses by it centuries ago. modern methods provided a means of improving stock in a way hitherto impossible. The use of a v sire could thereby be extended numerically and available to the small farmer. But so far there had no commercial application. In 1936 the Thorough Breeders Association had laid down that insemin should only take place for the benefit of the mare, save the sire. Obviously the method raised imm possibilities in the restocking of Europe, but tim necessary to decide whether a particular sire was or bad; breeders must go slowly and carefully. scale field trials were, however, in train at and Reading, and regulations relating to cattle nearly ready to lay before Parliament.

QUESTION TIME

Diseases not attributable to Service

Mr T. E. N. DRIBERG asked the Minister of Pensions if he would circulate the list of diseases held by the current consensus of medical opinion to be neither caused nor aggravated by military service.—Sir W. WOMERSLEY replied. It is impossible to extract from all the diseases known to medical science a complete list of those in the causation or worsening of which war service would be unlikely to play any part. There are, however, certain diseases or groups of diseases the onset or development of which would normally be unaffected by service, and of which the following are common examples. It should not be assumed, however, that every case in which the disability is due to one of these diseases is necessarily rejected.

[illegible] blood and [illegible]; (5) Progressive visual [illegible]; (6) Venereal diseases.

Army Consultants

Replying to a question, Sir JAMES GRIGG stated that the following are members of the Army Medical Department Consultants Committee

A. [illegible] (consulting surgeon to the army), [illegible]

Number of Births

Replying to a question Mr BROWN gave the following figures for England and Wales:

Date	*Total live births*	*Illegitimate live births*
1923 ..	. 758,131 .	.. 31,522
1933 .	.. 580,413 .	.. 25,408
1942	.. 655,075 ..	. 35,164

Obituary

HAROLD ERNEST GAMLEN

M B DURH, D P H

Dr. H. E. Gamlen died at North Cheriton, Somerset, on July 26, at the age of 72, after a long and trying illness which was the legacy of his pioneer work with X rays. Having qualified at Newcastle in 1893 and taken his DPH he was MOH for West Hartlepool before making the decision to specialise in radiology. He became X-ray surgeon to the Cameron and Hartlepools hospitals, practising also in Newcastle, and to this period belong his papers on the X-ray treatment of superfic[illegible] arthritis by high-frequen[illegible] war he served with the BE[illegible] General Hospital and as [illegible] E Force. In 1916 [illegible] published his method for the localisation for foreign bodies. When, some twenty years ago, he was forced to retire from his work in the North he settled in Somerset. Of his later years J. B. McD. writes:

"Gamlen made valuable contributions to radiology when it was still in the earliest and most critical stage of development. That he had endangered his own life by his work worried him little. He endured suffering, submitted to operations and, in the intervals, selected [illegible] breed his beloved scotch terriers, a hobby which he pursued with the same enthusiasm and success as had characterised his medical work. A grateful country [illegible]ted him but it was left to Gamlen himself to mould [illegible] future within the limitations of his physical affliction. [illegible] know what struggles this entailed, but he was blessed with friends—none more than his surgical colleagues who came to his rescue so often—and the constant companionship and encouragement of his wife [illegible] much to lighten his burden."

Notes and News

PRACTICAL GUIDE TO THE SULPHONAMIDES

IN eight years the therapeutic applications of the sulphonamides have widened until these drugs must be approaching aspirin and stomach powders in popularity. This rapid success has brought its own complications; and as each new compound is introduced the general practitioner must wonder whether it is indeed the great advance it is said to be, or merely an old friend under a new name. To solve some of these difficulties a booklet of [illegible] group of experts and issued a[illegible] War Memo No. 10 (*Medic*[illegible], HM Stationery Office, 9*d*). The reader should not be misled by the modesty of its format, nor by its title, for it contains all the available information needed to ensure the proper use of sulphonamides in both medicine and surgery. The booklet opens with a brief description of the chemistry, pharmacology and mode of action of the compounds, it then sets out the general principles governing their administration and a scheme of dosage which will meet most requirements. The common infections are taken in turn, and there are special sections on subjects of war-time importance such as wounds, burns and gas gangrene. The possible toxic complications are described and practical measures are recommended for their avoidance. Finally an appendix contains directions for such laboratory procedures as estimation of blood concentrations and the detection of sulphonamide-resistant strains of organisms. The doctor who is working without laboratory facilities should not be put off by the frequent references to these aids to a more scientific use of the drugs. If it is possible to estimate the concentration of sulphathiazole in the blood of [illegible] information is often gained [illegible]dingly. But if such estim[illegible] can still be used with reasonable safety and success, provided that the rules here laid down are applied with common sense.

Royal College of Physicians of London

At a comitia held on July 29, with Lord Moran, the president, in the chair, the following fellows were elected officers for the ensuing year:

Censors: Prof. F. S. Langmead, Dr. A. G. Gibson, Dr. G. E. S. Ward and Dr Geoffrey Marshall; *treasurer*, Dr. C. Hinds Howell; *registrar*, Dr. H. E. A. Boldero; *Harveian Librarian*, Dr. Arnold Chaplin; *assistant registrar*, Dr. Alan Moncrieff; *members of the library committee*: Dr Henry MacCormac, Dr. Reginald Hilton, Dr. Cyril Elgood and Dr. Archibald Gilpin; *finance committee*: Dr. George Graham, Dr. Maurice Shaw and Dr Kenneth Harris.

The Baly medal was awarded to Prof. F. C. Bartlett, FRS, for his work on the science of physiology and in particular his contributions in experimental psychology; the Gilbert Blane medal to Surgeon Commander D. P. Gurd, RN, and the Murchison scholarship to Dr. Bruce Cruickshank. Lord Dawson was re-elected representative on the governing body of the British Postgraduate Medical School and Dr. J. H. Towers a representative on the council of King's College, University of Durham. Dr. W. E. Hume will deliver the Harveian oration on Oct. 18.

The following having satisfied the censors' board were elected to the membership:

A. O. Beck, MB CAMB, Conrad Bremer, MD LEEDS, flying officer RAFVR, G. M. Brown, MD QUEEN'S [illegible] L. Doust, [illegible] LOND., C. [illegible] LOND., lieu[illegible] MD DURH., [illegible] Jones, MB [illegible]ter, R. G. [illegible] lieutenant [illegible] MD LOND., [illegible] J. C. S[illegible] MD MANC., [illegible] Wood, LRCP, FFP

Licences to practise were conferred upon 223 candidates (198 men and 25 women) who have passed the final examination of the conjoint board and have complied with the by-laws of the college. The following are the names of the successful candidates:

F. A. Adcock, Joseph Ainsworth, Sheila W. Anderson, J. K. Argo, L. E. Arundell, J. D. Auton, G. B. Barker, A. S. Barling, C. H. Barnett, A. F. Batchelor, D. C. Beatty, William Beautyman, Kathleen, N. Berger, G. R. T. Birtwhistle, W. A. Ll. Bowen, R. M. Boyce, J. B. Bress, D. B. Brewer, A. J. Briggs, Alexis Brook, Barbara G. Bull, J. C. Burne, M. O. Carruthers, Jack Carter, Margaret J. Cash, Keith Chitty, C. J. Christmas, H. P. Clarke, M. H. Clement, Beatrice D. Cluley, L. H. Collier, Gladys C. Collings, D. M. Colyer, Doris E. Counsell, J. G. Coxon, F. M. Cryer, J. H. Cule, K. G. Cuming, P. N. Cunliffe, Rosalind M. L. Darby, J. C. A. Davies,

T. M. Davies, Trevor Davies, William Davies, Winifred M. Davies, M. B. Devas, Gabriel de Vesselitsky Merriman, Sheila Donahue, D. C. Dougherty, M. A. C. Dowling, D. C. H. Draffin, Margaret Duncan, *P. V. C. W. Dupré, B. J. M. Duxbury, E. M. Edwards*, B. H. Egerton, G. S. Emtage, G. P. Enoch, F. H. Epstein, D. M. Evans, Hassam Fakim, Albert Feldman, J. A. Fewings, M. M. Figgis, M. A. Filose, O. D. Fisher, Frank Fletcher, K. W. Forber, D. V. Foster, Wallace Fox, H. A. Fraser, A. G. Freeman, R. J. T. Gardiner, M. R. Geake, R. V. Gibson, T. J. Gilmore, Harold Goldberg, Gerald Goodall-Copestake, A. W. G. Goolden, R. H. Gorrill, R. L. A. Gouges-d'Agincourt, S. H. Gould, Benjamin Green, W. H. Greenwood, I. L. Gregory, A. P. Grimbly, H. C. Gupta, D. L. Guthrie, R. M. Harvey, D. E. Hayes, J. S. Hayward, Michael Hemming, Jack Henneman, S. P. Higham, Gavin Hildick-Smith, G. F. Hird, C. A. Hodge, Monica M. Hogben, Herbert Holden, G. M. Homan, Philip Hopkins, M. C. Hudson Bennett, G. E. Hughes, E. A. J. Imossi, W. N. Ingham, Frank James, G. A. James, C. W. L. Jeanes, Ursula Jerram, R. E. W. Jesson, H. D. Jesudason, G. M. Jewson, A. G. Jones, B. V. Jones, L. G. G. Jones, D. A. G. Kaye, A. R. Kenderdine, S. M. Kingsley, R. F. S. Kirkham, Gershon Kohn, C. D. Laidlaw, J. W. Langley, R. W. Lawrie, W. F. Leith, Myer Leven, C. L. Lewis, E. H. Lewis, Gwenda M. Lewis, John Lister, R. H. Little, Renate M. E. Loeser, J. B. Lyon, I. M. MacArthur, M. D. McCready, N. G. McGuire, D. H. Mackenzie, R. M. MacPhail, A. K. Mant, H. L. Massiah, Colin Maxwell-Muller, J. B. Mee, J. B. Mehta, H. P. Merrick, Margaret E. Milter, L. L. Mistlin, J. B. Mitchell, A. J. Moon, Ambrose Morgan, Gwenllian B. Morgan, Ivy M. Morgans, J. S. J. Morley, J. D. Morris, F. G. Morse, M. V. Mulye, A. P. M. Nicol, Peggy K. L. Orton, B. G. Paul, A. N. Pearson, W. E. R. Pitt, Betty J. Poland, K. I. Price, K. J. Randall, B. O. Reed, J. M. Rees, M. F. Remy, B. W. Rhodes, P. G. Roads, B. V. Robinson, K. C. Robinson, Charles Romer, A. J. F. Saxton, K. H. L. Scougall, R. H. Sewe [illegible] S. S. Short, B. S. Skinner, A. N. Smith, G. B. [illegible] I. S. Staddon, C. S. M. Stephen, D. M. Stev [illegible] tevenson, R. H. Stillman, Alexander Stone, T. [illegible] Sylvester, J. L. Taylor, G. A. Terry, G. D. Thomas, Greta C. Thompson, W. G. Thomson, Cecily M. Tinker, Salo Tischler, W. H. Townsend, Willie Townsley, John Tregillus, C. E. Tudor, R. W. Tudor, G. E. E. Usher Somers, S. B. van der Merwe, E. G. Wade, M. T. Wade, Jack Waldman, M. F. C. Walker, E. L. Ward, F. A. Watkins, Roy Webb, J. O. M. Wedderburn, W. G. White, J. P. Whitehead, J. P. S. Whitehead, Marjorie Whitney, H. S. C. Wight, R. R. L. Wild, Audrey S. Willis, J. S. Winter, R. J. T. Woodland, A. J. W. Woodroffe, R. M. Woodside, Fred Wrigley, W. D. Wylie and D. E. Yates.

Diplomas in public health, psychological medicine, laryngology and otology, and anæsthetics were conferred on those named at the meetings of the Royal College of Surgeons in our issues of June 19 (p. 792) and July 17 (p. 90), and diplomas in ophthalmic medicine and surgery and medical radiology on those named below.

Royal College of Surgeons of England

At a meeting of the council held on July 29, with Sir Alfred Webb-Johnson, the president, in the chair, Sir Arthur Keith was reappointed representative on the joint committee for Anthropological Research and Training for 1943–47. It was decided to continue the recognition of the posts of RSO and first house-surgeon Kent and Sussex Hospital under the FRCS regulations, and to extend it to include the post of second house-surgeon.

Diplomas of membership were granted to the candidates named above. The following diplomas were also granted jointly with the Royal College of Physicians:

DOMS.—J. H. Austin, Hugh Bannerman, M. K. Fleischer, Alan Holnmes-Smith, William Ingman, W. H. R. Jeremy, Herbert Kirchenberger, R. S. MacLatchy, W. M. Rich, D. J. N. Smith, Alan Stanworth and E. S. Tan.

DMR.—E. M. Japha, H. G. Jones, Kathleen J. Mulvany, G. B. Stanford and E. M. Ungar.

Scottish Conjoint Board

At recent examinations of the board of the Royal Colleges of Physicians and Surgeons of Edinburgh, and the Royal Faculty of Physicians and Surgeons of Glasgow the following were successful:

LRCP & SE, LRFP & S

J. E. K. Butchart, J. B. Chetwynd, E. J. Connolly, P. M. Ellison, Julius Honig, Samuel Hellowell, R. H. Johnson, W. S. Joyce, W. B. Kalish, P. D. Kemp, Leonard Le Vann, Werner Levy, V. H. McGettigan, William McKenzie, Andrew Marshall, Paul Menko, T. S. Moore, H. D. Morgenbesser, C. E. Phillip, C. E. Ratner, W. M. Robinson, Olga C. Rollason, Aaron Simons, Bernard Snell, W. R. Steven, N. C. Wollin and Milton Zises.

Willi Hoffer, MD VIENNA, and Ernst Levin, MD MUNICH, graduates of recognised foreign universities, were also admitted licentiates.

Ambulances To and From London

Ambulances of the headquarters' fleet of the Order of St. John and British Red Cross Society returning empty to London from districts outside the Metropolitan area may be used to carry patients from the country to the London hospitals. Medical practitioners who have patients resident more than forty miles from London requiring transport to London should write to the joint secretaries, Home Service Ambulance Committee, 12, Grosvenor Crescent, S.W.1, two days before the date of the journey to ascertain whether the department will have an ambulance in their district in which the patient could travel.

Royal College of Obstetricians and Gynæcologists

The Council have received a gift of £1000 from a fellow to commemorate the presidency and knighthood of Sir William Fletcher Shaw. The interest from the gift will form a scholarship to be awarded triennially for research.

Infectious Disease in England and Wales

WEEK ENDED JULY 24

Notifications.—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 2099; whooping-cough, 2081; diphtheria, 591; paratyphoid, 9; typhoid, 10; measles (excluding rubella), 2486; pneumonia (primary or influenzal), 445; puerperal pyrexia, 152; cerebrospinal fever, 44; poliomyelitis, 5; polio-encephalitis, 0; encephalitis lethargica, 6; dysentery, 105; ophthalmia neonatorum, 77. No case of cholera, plague or typhus fever was notified during the week.

The number [illegible] sick in the Infectious Hospitals of the London [illegible] ly 21 was 1592. During the previous week [illegible] were admitted: scarlet fever, 196; diphtheria, 40; measles 22; whooping-cough, 33.

Deaths.—In 126 great towns there were no deaths *from scarlet fever, 2 (1) from enteric fevers, 1 (0) from* measles, 6 (0) from whooping-cough, 12 (0) from diphtheria, 46 (6) from *diarrhœa* and enteritis under two years, and 5 (0) from influenza. The figures in parentheses are those for London itself.

Coventry reported 1 fatal case of enteric fever. Birmingham an Bristol each had 4 deaths from diarrhœa.

The number of stillbirths notified during the week was 195 (corresponding to a rate of 28 per thousand total births), including 18 in London.

Births, Marriages and Deaths

BIRTHS

BRITTON.—On July 29, in London, the wife of Dr. C. J. C. Britton—a son.

BROOKE.—On July 23, in London, the wife of Mr. Bryan N. Brooke FRCS—a daughter.

CRICHTON.—On July 25, at Redhill, the wife of Dr. Crawfor Crichton—a daughter.

CROWDEN.—On July 29, at Church Crookham, Hants, the wife Lieut.-Colonel G. P. Crowden, RAMC—a daughter.

HUGGETT.—On July 28, to Prof. Esther Killick, MRCP, wife of Pro A. St. G. Huggett—a daughter.

ORR.—On July 25, at Congleton, Cheshire, the wife of Lieut.-Colone J. W. Orr, RAMC, of Rudyard, Staffs—a daughter.

TEASDALE.—On July 29, at Leeds, the wife of Surgeon Lieut. Commander J. M. Teasdale, RNVR, of Retford, Notts—daughter.

MARRIAGES

MULLER—MAYNE.—On July 24, at Greenwich, Andrej Muller, M [illegible] oslovak Forces, to Mary Hyacint [illegible] NS.

RIVI [illegible] 26, at Kilmacolm, Peter Alan Ha [illegible] MC, to Elspet Louise Strathie.

SCOTT—BRANFOOT.—On July 17, in London, Oliver Scott, MB, Katherine Ogle Branfoot.

SITA—LUMSDEN.—On July 27, at Lyme Regis, Edward Gilbe Sita, surgeon-lieutenant RNVR, to Stella Pirie Lumsden.

DEATHS

COWEN.—On July 24, at Newbury, Thomas Philip Cowen, MD LON. formerly medical superintendent of the Rainhill Mental Ho pital, Liverpool, aged 75.

FRITH.—On July 30, at Hove, Baptist Gamble Frith, MB DUB aged 83.

GAMLEN.—On July 26, at North Cheriton, Somerset, Harold Ern Gamlen, MB DURH., DPH, aged 72.

RENNIE.—On July 4, in India, William Benton Rennie, MC, ABERD., colonel late RAMC, aged 59.

SELBY.—On July 26, at Guildford, Edmond Wallace Selby, O. MD LOND., FRCS, of Leeds, retired divisional officer, Mini of Health.

VAUGHAN-JACKSON.—On July 27, Percy Vaughan-Jackson, MR surgeon captain RN, retd., of Sneyd, Berkhamsted, Ballina, co. Mayo, aged 80.

WARD CLARKE.—On July 27, at Capel, Surrey, Harry Ward Cla MRCS, aged 79.

WHITEHOUSE.—On July 28, Sir Beckwith Whitehouse, MS LON CH M. HON. BIRM., FRCS, FRCOG, of Edgbaston.

Instances have occurred recently of local authorities advertising vacant medical posts in the journals without having first obtained the consent of the Minister of Health to filling the post, when this consent is necessary under circ. 2818. Candidates for appointments under local authorities would, therefore, be well advised to consult the Principal Regional Medical Officer in the region where they work before making an application.

The fact that goods made of raw materials in short supply owi to war conditions are advertised in this paper should not be tak as an indication that they are necessarily available for expo

TOXICITY OF TANNIC ACID

AN EXPERIMENTAL INVESTIGATION

G. R. CAMERON
M B, D SC MELB, F R C P
PROFESSOR OF MORBID ANATOMY
IN THE UNIVERSITY OF LONDON
AT UNIVERSITY COLLEGE HOSPITAL
MEDICAL SCHOOL

R. F. MILTON
B SC LOND, F I C

J. W. ALLEN

(*Illustrations on Plate*)

WE report an experimental investigation into the toxicity of tannic acid and the chances of its absorption from burned areas. Some information about the fate of tannic acid after it reaches the circulation is given and contrasted with the behaviour of gallic acid.

Our experiments have been carried out on goats, rabbits, guineapigs and rats, 250 animals being used in all. Tannic acid (*BP*) was obtained from 7 different firms, one such sample being employed for most of the experiments, the others being tested for toxic action on the organs alone. This main sample contained about 20% gallic acid.

AVERAGE LETHAL DOSES OF TANNIC ACID

1. *LD·50*[1] *of tannic acid.*—Table I summarises the results of giving and subcutaneous routes. water was ised. The LD 50

	subcutaneous dose mg./kg.	intravenous dose mg./kg.
Goat	300	20
Rabbit	1000	10
Guineapig	500	
Rat ..	1500	

he rat is the most resistant animal, the guineapig and oat the least. The high ratio between subcutaneous and ntravenous doses suggests that there is slow absorption rom and most likely precipitation in the subcutaneous issues.

ABLE I—LD 50S OF TANNIC ACID GIVEN INTRAVENOUSLY AND SUBCUTANEOUSLY

Species and route	Dose (mg./kg.)	No. of animals	No. dying	Mortality (%)	Survival (days)
ubcutaneous					
oat ..	500	3	3	100	1, 3, 3
	300	2	1	50	13
	100	3	0	0	..
	50	3	0	0	..
abbit ..	1000	5	4	80	3, 3, 4, 5
	500	5	0	0	..
uineapig	1000	5	4	80	5, 5, 6, 7
	500	5	5	100	3, 5, 6, 6, 8
	250	5	0	0	..
	100	3	0	0	..
	50	3	0	0	..
	25	3	0	0	..
	15	3	0	0	..
at ..	1500	5	3	60	1, 1, 2
	1000	5	1	20	2
	500	8	2	25	1, 1
	250	6	0	0	..
	100	3	0	0	..
	50	3	0	0	..
	25	3	0	0	..
	15	3	0	0	..
ravenous					
at ..	20	2	1	50	1
	15	2	0	0	..
	10	6	0	0	..
bbit ..	100	4	4	100	All died immed.
	50	3	3	100	10 min.; 10 min.; 3 hr.
	25	3	2	67	25 min; 30 min.
	20	5	3	60	1, 1, 7
	15	3	2	67	11, 16
	10	3	2	67	8, 8
	5	3	0	0	..

Immed. = immediately.

THOLOGICAL CHANGES PRODUCED BY TANNIC ACID

nimals were given 5% tannic acid solution both avenously and subcutaneously and by spraying ned surfaces. Careful autopsies were performed on nimals dying and on survivors 4 weeks after administion of tannic acid. Some animals were killed at t intervals so as to follow the pathological course.

Material from heart, lungs, liver, kidneys, adrenals, spleen, stomach, small and large intestines, genital organs, sites of subcutaneous injection and skin application, and bone-marrow (but not the nervous system) were fixed in 10% formol saline, 10% formol alcohol, Susa, and buffered formalin; frozen and paraffin sections were prepared, and stained with Ehrlich's acid hæma- 's iron hæmatoxylin and van stain, Mallory's aniline-blue R, Turnbull's Jenner method for bone-marrow, and in a few instances with Best's carmine method for glycogen after absolute-alcohol fixation.

Intravenous injection of fatal doses of tannic acid resulted in death within a few minutes or after several days. Rapidly fatal cases showed sudden collapse, convulsions, coma and death from respiratory failure. The most striking features at autopsy in these were dilatation of the heart and blood-vessels and coagulation of the blood. Delayed cases gave no clinical signs at or after injection beyond loss of appetite and a steady loss of weight. Post-mortem appearances resembled those seen after subcutaneous injection. Accordingly, we give a general description of this group since individual variations are slight.

Such animals were noticeably quiet, refusing food though taking water, often in large amounts. Diarrhœa often developed in a day or two and persisted throughout the course of the illness. Wasting was severe, sometimes extreme. No eye changes were noted. Respiration became hurried and shallow towards the end, especially when pulmonary œdema occurred. A short period of unconsciousness preceded death; convulsions were not noted in the delayed cases.

At autopsy the animal appeared wasted and often showed evidence of diarrhœa and staining of the fur with urine. The site of subcutaneous injection was grossly œdematous especially in the first 3 days, later œdema was much less obvious and a good deal of fibrin was present, with a fairly severe acute inflammation. In a few instances there was breakdown of the tissues.

The *heart* was often dilated, both ventricles being affected, and scattered petechiæ and larger hæmorrhages were present in the epicardium of auricles and ventricles. The heart muscle was often pale and in the longer cases showed fatty change. Large veins of the neck and thorax were congested.

The *lungs* were usually distended with air, mottled with petechiæ or large hæmorrhages which were commonest in the pleural tissues of the lower lobes. Hæmorrhages in the substance of the lungs were uncommon. Pulmonary œdema was seen in some animals, most often in those dying within 2 or 3 days after injection of tannic acid. There were no cases of pneumonia. Pleural fluid was seldom increased; one goat developed acute fibrinous pleurisy and mediastinitis. We noted a tendency of the lungs to stick to the parietal pleura when the chest was opened and occasionally were able to refer this to a very fine layer of fibrin on the pleuræ. Trachea and bronchi showed no changes in their walls. Bronchial glands were normal.

The *liver* in acute cases appeared swollen, congested and soft, with rounded edges; after 24–48 hours it was mottled with small, sometimes confluent, areas of yellow or grey necrosis, which were most numerous along the edges of the organ.

distended with dark green bile but no lesions were found in its wall, nor were the bile-ducts and pancreas affected. The *kidneys* were usually swollen, pale with a broad indistinct or blurred cortical pattern and very congested medulla. The capsule stripped with ease leaving a bulging mottled surface. No changes were noted in the pelves, ureters, bladder and genital organs. The *spleen* was often small, pale and collapsed as if depleted of blood in the early deaths, but normal or congested in the later stages. No gross change was detected in the lymph glands and bone-marrow. The *stomach* contained much partly digested food, its wall being congested and sometimes showing scattered mucosal hæmorrhages or erosions. A little altered blood was then apparent in the gastric cavity. Small hæmorrhages were sometimes found in the mucous coat of the small and large intestines, but no ulceration was noted. Large gut content often was fluid especially when the animal died in the first 3 days after administration of tannic acid. A true enteritis, however was not seen. Peritoneal effusion, rich in plasma proteins, often occurred in animals receiving subcutaneous injection of tannic acid and amounted in some small animals to 10 c.cm. Guineapigs were especially liable to this lesion. Goats, too, showed ascites, with large masses of gelatinous material in the omentum and mesentery. Such effusions were most often seen in animals dying within 2 or 3 days of injection.

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[1] verage dose which will kill off 50% of animals in 2–3 days.

The *brain* and spinal cord presented no obvious abnormality beyond a certain "dryness" in the early stages of poisoning and some far from constant congestion.

We noted no tendency on the part of tannic acid to terminate pregnancy in our female animals.

Similar autopsy findings, though less severe, were found in animals given smaller doses of tannic acid by similar routes and deliberately killed at intervals for study of the pathological process.

Microscopic examination confirmed the presence of pulmonary œdema in a proportion of cases, cloudy swelling and fatty change in the heart muscle of most animals, and very mild degenerative change in the mucosal epithelium of the stomach and intestines, amounting to erosion when associated with mucosal hæmorrhage. In a few rabbits we came across recent thrombi in the swollen pulmonary veins and arteries; in one such case lung infarction had developed and in another, surviving 20 mg. per kg. tannic acid intravenously, canalisation of a thrombus was noted. These changes were, however, inconstant and unimportant compared with those seen in the liver and kidneys.

The *liver* is often severely damaged after the administration of tannic acid. During the first 5 hours after subcutaneous or intravenous injection of moderate or large doses there was no apparent change beyond a diminution of the glycogen content of the organ. Histological assessment of glycogen content is notoriously difficult despite care in pre-experimental feeding, investigation of controls and attention to technical details; so that we place no emphasis on this observation. Mitochondrial disturbance, likewise, is difficult of interpretation. We note the suggestive fact that mitochondria in liver cells grouped around the central vein of the lobules often appear in process of breaking up from threads into granules and are sometimes missing. From the 5th hour onwards, clearcut evidence of damage of liver cells appears terminating in coagulation necrosis of the centres of the lobules uniformly distributed throughout the organ (fig. 1). Bordering upon these areas are groups of liver cells rich in fat granules and globules. By the end of the first 24 hours these changes are generally widespread, resulting in the conversion, when the dose of tannic acid is large, of the greater part of the liver into a mass of necrotic cells rimmed by marrow zones of healthy or fat-containing liver cells. Cytolytic necrosis soon makes its appearance and during the second and third days of intoxication reaches a maximum (fig. 2). From then onwards, either the animal dies, apparently from acute hepatic insufficiency, or regeneration of liver tissue commences (fig. 3), sometimes to be interrupted by death at a later stage, sometimes proceeding to complete recovery. The goat and guineapig are especially suitable for studying these changes. In no instance could we detect pathological change in the bile-ducts nor lesions in the blood-vessels of the portal canals. In one or two cases we found thrombi in the intrahepatic branches of the portal vein, but these were late in origin and were of secondary importance.

Regeneration proceeds concurrently with removal of dead liver cells by cytolysis and absorption and to some extent through phagocytosis (figs. 4, 5, 6). At an early stage the margins of the necrotic material are infiltrated by polymorphonuclear leucocytes, though seldom to a considerable degree. From the second day onwards, mononuclear cells increase in numbers until they far exceed the polymorphs. Proliferation of reticulo-endothelial cells (Kupffer cells) contributes to this mononuclear infiltration and occasionally, in the later stages, multinucleated giant cells are formed. Regeneration results from the ingrowth of new liver cells, the product of surviving marginal tissue, mitotic figures being numerous in this region. New formation of connective tissue is slight so that, as a rule, complete recovery follows without the production of scar tissue in the liver. The speed of regeneration is determined in the first instance by the amount of initial damage and by species differences. With large but sublethal doses of tannic acid administered subcutaneously the goat completely regenerated its liver in about 10 days, the rabbit, guineapig and rat in 6–8 days. Success in regeneration depends to a great extent on uniformity in distribution of the initial damage throughout the lobules. With fusion of adjacent areas of necrosis, resulting in the formation of large confluent infarct-like masses of dead liver, removal and replacement is a much slower affair and often lingers on for many weeks. Moreover, such areas constitute a real danger because of their susceptibility to secondary infection or to spreading thrombosis throughout near-by normal liver areas.

Renal changes, though constant in our experience, are slight and of short duration. They develop in about 24 hours and include cloudy swelling and slight fatty change in the convoluted tubule cells and lining epithelium of Henle's loops. In several instances goats showed necrosis of tubules when liver damage was very severe. Glomeruli appear unaffected. Granular and fatty casts are sometimes present for a short time, but by the fourth day the kidney has returned to normal, and no permanent structural damage persists.

Some evidence of *bone-marrow* stimulation is found in the form of recently developed hæmatopoietic foci among the fatty marrow of goats. Œdema of the marrow may be present, especially after intravenous injection of tannic acid.

From the pathological investigation, we conclude that tannic acid when introduced into the circulation by the subcutaneous or intravenous routes acts primarily on the liver cells and to a much less extent on renal epithelium damaging or destroying them according to the concentration reached.

We have also paid some attention to the local effect produced by subcutaneous injection of tannic acid in small divided doses. Within 24 hours, œdema is extensive at and around the site of injection, often taking the form of a firm gelatinous mass extending for considerable distances in directions apparently determined by gravity.

In an attempt to obtain a rough quantitative idea of the severity of œdema, we dissected out the anterior abdominal muscle of 10 normal 500 g. guineapigs, injected with normal saline and 8 guineapigs injected with 500 mg./kg. tannic acid administered as a 5% solution, which is almost isotonic. Sites of injection and amounts of muscle corresponded in the two experiments, and similar amounts of fluid were used. Dr. F. C. Courtice kindly determined the wet weight and water content of the muscle. The mean weight of the normal group was 8·32 g. of the tannic injected group 16·21 g., an increase 7·89 g. The mean increase in water was 7·01 g. In 24 hour therefore, the injected site showed a 95% increase in weight 89% of the increase being due to water. Histological examination shows that tannic acid induces necrosis of the muscle and to a much less extent of collagen fibres, followed by acute inflammation which may persist for weeks. Granulation tissue appears in 3–5 days; scarring may be severe. Muscle cell regeneration is often apparent after a couple of weeks. We have noted the presence of thrombosed vessels at an early stage in some animals. The inflammatory reaction proceeds in the absence of infection and is no doubt the result of the coagulative action of tannic acid on the tissue proteins.

BLOOD CHANGES DUE TO TANNIC ACID

We have studied the hæmoglobin percentage (method) red and white cell counts (Bürker cc chamber), hæmatocrit value (modified Lovatt E method, using 10 capillary tubes), and differential whi cell count of goats, rabbits, guineapigs, and rats af subcutaneous and in a few instances intravenous injecti of 5% tannic acid solution. Tables II and III s these results. Dr. Courtice estimated the blood- (T. 1824 dye method using a spectrophotometer), proteins and non-protein-nitrogen (NPN) in a num our animals. Figs. 7 and 8 show some rep curves.

Subcutaneous injection of large amounts of tannic leads to a rise in hæmoglobin percentage, red-cell count hæmatocrit value within 24 hours, associated with a fal total blood-volume and plasma-volume but little or no in total corpuscular volume. It may thus be suggested plasma is lost from the circulating blood with resul hæmoconcentration. At the same time there is a fall in plasma-protein percentage. This, we believe, indicates increased permeability for proteins on the part of the laries somewhere in the body and is the reason for the plasma. We have previously pointed out that œdema site of subcutaneous injection of tannic acid is usually se and there is little doubt that it may account for the concentration in many animals. Ascites is also a contribu factor and much less often pulmon[illegible] ced, there [illegible] aries since [illegible] y animals [illegible] and in this instance [illegible] was no localised œdema as with subcutaneous injection.

But permeability alteration is not the whole story. With decreasing subcutaneous doses of tannic acid we reach a stage, at any rate in [illegible] evidence of [illegible] plasma protei[illegible] subcutaneous[illegible] 50 mg. per kg. tannic acid the plasma proteins fell from 5·0 and 6·6% to 4·2 and 5·8% respectively in 5–24 hours, returning to normal soon afterwards; no definite evidence of hæmoconcentration was present in goat 69, while goat 68 showed only a moderate increase in hæmoglobin and red cells. Such observations may indicate a direct effect of tannic acid on plasma protein production or stabilisation, possibly through an action on the liver, but this is merely [illegible] proteins being removed [illegible] nnic acid has to be con- [illegible] show later on, soon dis- [illegible] en injected intravenously

TABLE III—MEAN HÆMOGLOBIN PERCENTAGES AND RED-CELL COUNTS AFTER SUBCUTANEOUS INJECTION OF TANNIC ACID

Species	No. in group	Dose (mg./kg.)	Before injection		5 hr. after		24 hr. after	
			Hb. %	Red cells (mills. c.mm.)	Hb. %	Red cells (mills. c.mm.)	Hb. %	Red cells (mills. c.mm.)
Rabbit ..	4*	1000	75	6·17	82	6·55	88	6·83
	4†	500	71	6·08	70	6·23	74	6·18
Guineapig	12	500	93	5·94	121	7·28	84	5·25
	5‡	250	88	..	94	..	90	..
	5‡	100	88	..	95	..	90	..
Rat ..	5	1000	105	8·57	119	10·91	125	10·80

* 3 showed hæmoconcentration, 1 did not.
† 1 showed hæmoconcentration. ‡ 2 showed hæmoconcentration.

—long before alterations in plasma-protein content appear. With subcutaneous injection, the tannic acid concentration in the blood is not sufficient to precipitate plasma proteins, for in-vitro tests have shown that a plasma level of 100 mg. tannic acid per 100 ml. must be

TABLE II—BLOOD CHANGES IN GOATS (FOUR GROUPS OF 3 GOATS EACH) AFTER SUBCUTANEOUS INJECTION OF TANNIC ACID (TA)

Time	Goat no.	Hb. %	Red cells (mills. c.mm.)	Hæmatocrit %	Leucocytes (thousands/c.mm.)	Blood volume			Plasma proteins (g. per 100 ml.)	Non-protein nitrogen (mg. per 100 ml.)
						Plasma vol. (c.cm.)	Total corpuscular vol. (c.cm.)	Total blood vol. (c.cm.)		
Before injection	16	68	12·86	27·5	9·2	1418	534	1952	5·8	40
	17	61	12·98	23·6	22·6	1152	362	1514	5·1	36
	18	64	14·18	22·7	11·4	1507	443	1950	6·7	32
5 hr. after 500 mg./kg. TA	16	102	18·21	..	10·6	..	..	..	5·5	44
	17	73	17·28	..	20·4	..	..	..	5·2	30
	18	85	18·16	..	21·2	..	..	..	6·5	34
24 hr. after	16	110	19·58	39·7	13·8	1110	730	1840	5·2	92
	17	74	..	28·7	27·6	979	391	1370	4·7	52
	18	135	21·29	38·3	23·4	1295	805	2100	4·3	98
48 hr. after	16	84	16·83	35·6	13·6	1020	900	2520	4·8	183
	17 (18d.)	60	13·56	22·1	17·8	1295	365	1660	4·5	129
72 hr. after	17 (16d.)	60	12·13	23·7	20·8	1288	397	1685	5·8	160
4 days after	17	55	12·22	..	15·6	..	..	..	5·7	170
5 days after	17	55	13·60	..	32 0	..	..	..	5·6	185
7 days after	17	48	..	..	31 6	..	..	..	5·9	180
10 days after	17 (d. 11th day)	..	..	..	..	..	..	..	6·5	210
Before injection	13	82	16·72	..	7·2	..	..	..	..	..
	14	70	15·16	..	17 8	..	..	..	..	..
	15	48	6·93	..	7·6	..	..	..	..	..
hr. after 500 mg./kg. TA	13	108	20·24	..	16 6	..	..	..	..	..
	14	96	17·08	..	29·6	..	..	..	..	..
	15	60	9·17	..	11·6	..	..	..	..	..
4 hr. after	13	115	23·21	..	11·4	..	..	..	..	..
	14	106	16·81	..	10·4	..	..	..	..	..
	15	62	13·97	..	7·8	..	..	..	..	..
days after	13	98	20·19	..	15·14	..	..	..	..	..
	14	90	18·94	..	14·4	..	..	..	..	..
	15	54	10·17	..	6·2	..	..	..	..	..
days after	13	100	20·01	..	16·0	..	..	..	..	..
	14	102	18·94	..	16·0	..	..	..	..	..
	15	46	10·17	..	8·8	..	..	..	..	..
days after	13	100	20·83	..	17·2	..	..	..	..	..
	15 (14d.)	42	9·61	..	7·6	..	..	..	..	..
Before injection	58	65	11·05	..	13·2	..	..	..	6·9	32
	59	54	7·77	..	8·2	..	..	..	7·1	27
	60	70	14·32	..	9·8	..	..	..	8·2	24
5 hr. after 100 mg./kg. TA	58	74	11·00	..	12·0	..	..	..	7·0	32
	59	66	8·48	..	15·2	..	..	..	6·4	30
	60	82	16·02	..	22 8	..	..	..	8·2	30
24 hr. after	58	74	12·86	..	9·8	..	..	..	5·7	40
	59	54	10·30	..	9·6	..	..	..	5·7	30
	60	98	19·97	..	17·4	..	..	..	6 8	38
2 days after	58	68	9·75	..	7·6	..	..	..	6·1	47
	59	50	10·28	..	7·0	..	..	..	5 3	37
	60	80	13·07	..	14·6	..	..	..	7·0	34
3 days after	58	63	11·36	..	10·8	..	..	..	..	42
	59	38	8·14	..	10·2	..	..	..	6·4	37
	60	65	11·27	..	16·2	..	..	..	7·3	30
5 days after	58	60	10·52	..	16·2	..	..	..	6 0	29
	59	34	6·41	..	14·2	..	..	..	6·1	25
	60	72	14·95	..	20·6	..	..	..	7·0	25
7 days after	58	60	11·00	..	10·0	..	..	..	6·8	30
	59 (60k.)	24	4·44	..	10·8	..	..	..	6·5	27
9 days after	58	54	10·27	..	14·2	..	..	..	6·7	31
	59	21	4·01	..	12·2	..	..	..	7·6	31
Before injection	67	68	18·13	..	12·4	..	..	..	6·0	37
	68	68	13 81	..	13·6	..	..	..	5·0	35
	69	56	13 84	..	15·6	..	..	..	6 6	41
5 hr. after 50 mg./kg. TA	67	66	18·0	..	13·0	..	..	..	5·9	37
	68	75	16 09	..	17 0	..	..	..	4·2	37
	69	60	14·9	..	17 8	..	..	..	7·4	40
24 hr. after	67	67	19·73	..	22 0	..	..	..	5·3	37
	68	76	16·28	..	15·8	..	..	..	4·9	42
	69	62	14 06	..	16·4	..	..	..	5·8	45
2 days after	67	60	16·46	..	15·4	..	..	..	6·5	35
	68	70	17·64	..	11·2	..	..	..	5·5	37
	69	62	12·46	..	7 8	..	..	..	6·9	37
3 days after	67	58	16·56	..	13 2	..	..	..	6·4	42
	68	74	16·36	..	13·0	..	..	..	5·6	42
	69	62	11·03	..	7 0	..	..	..	3 2	32
4 days after	67	57	16·17	..	14·4	..	..	..	7·0	40
	68	74	17·37	..	15·2	..	..	..	6·5	45
	69	64	11·79	..	7 6	..	..	..	8·3	32
5 days after	67	62	16·86	..	10 6	..	..	..	6·4	40
	68	70	17·32	..	16·2	..	..	..	5·7	37
	69	58	13·67	..	5 8	..	..	..	7·2	34

d. = died; k. = killed.

reached before precipitation of protein commences. No such level is approached in our experiments, and we do not consider that direct precipitation by tannic acid is of importance in explaining the plasma-protein variation.

A rising NPN value is often seen and seems to be correlated with the severity of poisoning. With large doses of tannic acid, especially when fatal, high NPN levels are reached; with smaller doses there may be a transitory increase with return to normal in a few days. The explanation for this phenomenon is obscure. It might be the result of renal insufficiency, though we have not been impressed by the renal damage noted microscopically. In the absence of investigation of renal function we cannot, however, exclude this possibility. Another suggestion is that the rising NPN value is due to increased protein katabolism. The body-weight commonly falls as the NPN rises. Many observers have remarked on the association of loss of weight, rise in blood-urea, oliguria and increased urinary excretion of urea in conditions of anhydræmia, the result of simple dehydration, intestinal obstruction, diarrhœa from many causes, injection of hypertonic sucrose (Marriot 1923). Diarrhœa has been a feature in some of our animals, but was far from constant. Salivation did not occur. Another factor may well have been the breakdown of plasma proteins lost through local œdema at the site of injection, ascites or pulmonary œdema. Dr. Courtice informs us that when 100 c.cm. of rabbit's serum is injected subcutaneously into a normal rabbit, the urea output definitely increases though the blood-urea value remains unaltered. It is obvious that more work needs to be done on this problem before a satisfactory explanation can be reached.

Leucocytosis has been a constant finding in our animals after subcutaneous injection of tannic acid. It may appear as early as 3 hours, being preceded sometimes by a fall in leucocytes. At 24 hours the white count is generally high though some animals have shown a normal or even decreased count, only to increase at 48 hours. Leucocytosis may persist for several weeks, whilst the local inflammation is going on. Polymorphonuclear leucocytes are chiefly concerned in the increase, and there is evidence of bone-marrow stimulation. No doubt products of necrosis produced at the site of injection of tannic acid play a part in the leucocytic response, but there is evidence that leucocytosis also follows on intravenous injection of tannic acid so that the possibility of a direct action on the bone-marrow cannot be excluded.

We conclude from these experiments that tannic acid in large doses induces local loss of blood-plasma, sometimes plasma loss in quite diverse parts of the body with resulting hæmoconcentration and accompanying rise in blood NPN. We suggest that this is evidence that tannic acid may act as a capillary poison, both locally and when absorbed into the circulation.

Absorption of tannic acid from normal tissue, and burned surfaces.—So far our investigation might be dismissed as one of scientific interest only, with little bearing on reality. The main question asked by the practical person is whether tannic acid can be absorbed from a tanned burn in amounts sufficient to induce the injurious effects we have described.

To answer this question it is necessary to present evidence: (1) of the presence of tannic acid in the blood after tanning burnt areas; (2) of the occurrence of systemic effects under such conditions; and (3) that the blood tannic acid is capable of producing injurious effects. If such an association be established, it is reasonable to conclude that a case has been built up against tannic acid. Further, it might be possible to define the conditions under which serious effects due to tannic acid are to be expected.

TABLE IV—BLOOD "TANNIC ACID + GALLIC ACID" OF GOATS AFTER INTRAVENOUS INJECTION OF TANNIC ACID

Readings before injection were all negative

Dose	Goat no.	"Tannic + gallic acid" (mg./100 c.cm. plasma) after injection (mins.)								
		1	5	15	30	90	120	180	270	360
10 mg./kg. TA as 5% solution	70	11·7	10·7	7·0	5·5	4·2	4·0	2·4	..	..
	71	11·0	13·0	10·2	8·7	5·2	3·7	2·0	0·15	..
	72	15·2	11·2	9·5	6·7	5·5	3·7	3·2	0·15	0
	73	14·2	13·2	9·7	9·0	6·2	5·0	4·7	4·2	0·17
	74	13·5	13·0	10·5	9·5	6·5	5·5	3·5	2·5	0 17
	88	16·7	11·0	8·5	7·5	6·0	5·2	4·7	0·2	0 17

Estimation of tannic acid in blood.—The key to our investigation lies in the establishment of a satisfactory means of estimation of the minute amounts of tannic acid likely to be encountered in body fluids—especially blood. Tannic acid is a precipitant of proteins and polypeptides, but the complexes formed are very slightly soluble if the tannic acid is not in excess and certain substances found in biological fluids are present. Under such conditions minute quantities of tannic acid may circulate in the blood-stream in a soluble condition.

After a practical survey of the possible methods, we de to use the ferric chloride reaction as a means of es since it is very sensitive and gives reproducible results.

This method consists in measuring the depth of bluish- colour given when small amounts of ferric chloride are to plasma. The colour is most readily measured in Spekker photoelectric absorptiometer. The instrument fitted with a red filter to neutralise the effect of any hæmolys Since the ferric tannic complex quite readily precipitates the plasma solution, to obtain a constant reproducible it is maintained in colloidal solution by the incorporation of protective colloid. The colour produced is affected by the of the solution, but in plasma this is maintained constant the buffering power of the proteins present.

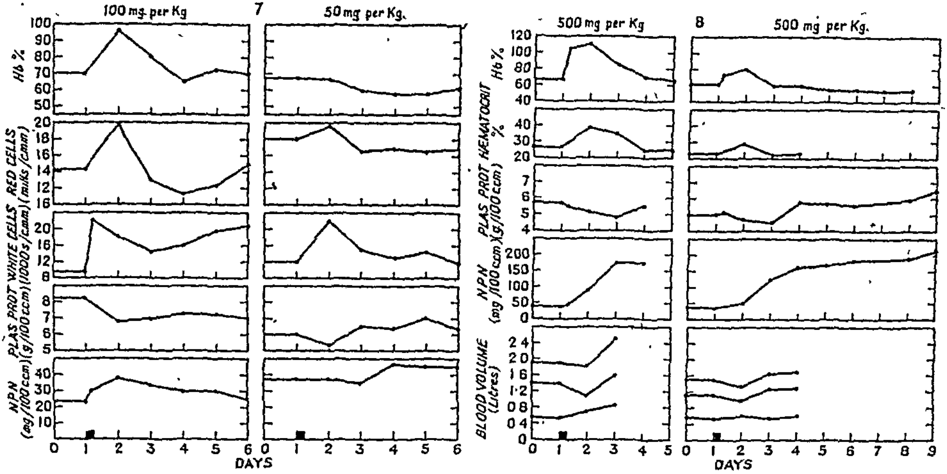
The amount of ferric chloride added must be very since excess causes precipitation of the proteins and quent turbidity. Below the precipitation limit the amount iron salt added does not affect the colour, provided that is sufficient to form the complex. The colour reaches its maximum after a few minutes and is quite for at least 6 hours. The method is standardised by normal plasma and adding to it varying amounts of tann acid and measuring the absorption in the Spekker addition of ferric chloride. In practice it is best to make readings—(*a*) on the plasma solution and (*b*) again after tion of ferric chloride. The difference represents colour due formation of the ferric-tannic complex, and assures that absorption due to turbid sera is allowed for. Then a

TABLE V—BLOOD "TANNIC + GALLIC" ACID OF GOATS AFTER INTRAVENOUS INJECTION OF TANNIC ACID

After injection (mins.) mg./100 c.cm. plasma

Dose	Goat no:	1			5			15			30			60			90			120			180			310	
		G	GT	TA	G	GT	TA	G	GT	TA	G	GT	TA	G	GT	TA	G	GT	TA	G	GT	TA	G	GT	TA	G	GT
15 mg./kg. TA as 5% soln.	350	3	21·5	18·0	2	17	15	0	14·2	14·2	0	11·2	11·2	0	8	8	0	6·2	6·2	0	4	4	0	2·7	2·7	0	0 7
	351	3	18	15	1	14 2	13·2	0	11	11	0	8·5	8·5	0	7·2	7·2	0	4·5	4·5	0	3	3	0	2·0	2 0	0	0 5
		1			5			15			45			75			105			165			255			315	
20 mg./kg. TA as 5% soln.	354	2·5	20·7	18 2	3·0	27·0	24	3·5	20	16·5	0	16·5	16·5	0	12·5	12·5	0	9	9	0	5·5	5·5	0	2·7	2·7	0	2 2
	355	3·5	23 0	19·5	3·5	17	13·5	4	16	12	1·5	11	9·5	3·5	8	4·5	3	7	4	2·5	4	1·5	0	2	2	0	2

The gallic acid might well be accounted for by that present in the sample of tannic acid.
G = gallic acid, GT = gallic acid + tannic acid (ferric chloride estimation). TA = tannic acid.



Figs. 7 and 8—Blood changes in goats after subcutaneous injection of tannic acid (as 5% solution).

tion curve is constructed relating Spekker readings to tannic acid content.

The method is not specific for tannic acid for a number of other phenolic bodies react similarly, but we have not been able to demonstrate the presence of such bodies in the many normal animal sera examined by this technique.

The possibility of the absorption of tannic acid from burned areas after breakdown to gallic acid has been suggested by Prof. R. A. Peters. The ferric chloride method estimates gallic as well as tannic acid. It is therefore necessary to differentiate between gallic and tannic acid. This is a very difficult task, since all standard methods fail when applied to the minute traces which we find circulating in the blood-stream.

We have therefore devised a method based upon the oxidation *of gallic acid in alkaline solution to a coloured quinonoid* complex. Tannic acid does *not* react to anything like the same extent under the conditions of the test. Thus by [illegible] however, that too much stress should not be placed on the quantitative results of such gallic acid estimations since the compound errors of results obtained by difference are exaggerated.

The method for gallic acid consists in adding to the plasma an alkali, quickly followed by sodium hypochlorite. After [illegible] recipitated unless maintained in solution with a protective olloid. Urea is also added to stabilise the complex. Much xperimental work was necessary to establish the optimum onditions for this test; alternative alkalis—e.g., ammonia, riethanolamine, and other organic bases gave stable colorations but sodium carbonate gave the greatest degree of ensitivity and reproducibility.

The methods finally adopted are as follows:

TANNIC ACID (+ GALLIC ACID)

Solutions.—(1) 5% ferric chloride solution in water. (2) 4% gum ghatti solution in water. (Suspend 2 g. of gum in a irebasket at the top of a cylinder filled to 500 ml. with dislled water. Allow to extract overnight and then filter.)

Method.—Samples of blood are collected from the jugular ein in the case of the goat and the ear in the case of the bbit. Great care must be taken to see that there is no con-mination of the sample with the large amounts of tannic id which might be on the skin or fur of the animal; potasum oxalate prevents coagulation; citrate must not be used nce this produces turbidity with the ferric chloride. The shed blood is centrifuged at a high speed; the clear plasma separated off, and 4 ml. of it are pipetted into a clean tube; 2 ml. of water and 1 ml. of gum ghatti solution are added. After mixing, the solution is read in the Spekker fitted with red screen no. I. Then exactly 0·05 ml. of ferric chloride solution is added and the solution thoroughly mixed. After about 5 min. the colour is again measured in the Spekker and the reading difference referred to the calibration graph correlating Spekker reading to concentration of tannic (or gallic *acid or both). It must be emphasised that Spekker cells* should be thoroughly cleaned before use, to get rid of any protein film that may have formed in previous estimations. The method estimates quantities of tannic acid up to 1 mg. with an error of ± 5%.

GALLIC ACID

Solutions.—(1) 50% urea solution; (2) 25% sodium carbonate; (3) sodium hypochlorite (commercial strength).

Method.—Take 4 ml. of plasma, add 1 ml. of urea solution and 2 ml. of water. Read in the Spekker fitted with the red screen. Add 0·2 ml. of 25% sodium carbonate and 0·1 ml. of hypochlorite. Mix, stand for 10 min. and read again. Then *the difference figure (corrected for dilution effect due to addition of reagents)* is referred to the calibration curve prepared from known amounts of gallic acid added to plasma.

Absorption after injection.—When tannic acid is introduced directly into the circulation of goats, it

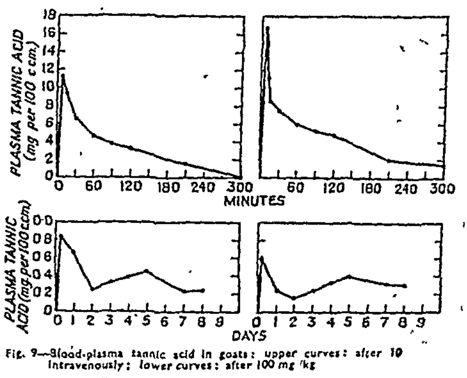


Fig. 9—Blood-plasma tannic acid in goats: upper curves: after 10 intravenously; lower curves: after 100 mg /kg

disappears after about 6 hours (tables IV and V, fig. 9 (*a*)). With subcutaneous administration, however, there is slow but continuous absorption over many days, no doubt due to precipitation of a certain amount of the tannic acid at the site of injection (table VI, fig. 9 (*b*)). Gallic acid, on the other hand, rapidly disappears from the blood after intravenous and subcutaneous injection (table VII). Moreover, very large amounts of gallic acid are tolerated by animals without damage to the liver.

We have carried out a few experiments on the excretion of these substances. Both gallic and tannic acid may appear in the bile within an hour; in the urine, however, it is mostly gallic acid which appears when tannic acid is administered.

Absorption from burnt surfaces.—It seems that slow absorption of tannic acid from subcutaneous tissues leads to a well-maintained, though low, blood-level of tannic acid for a number of days. Since a single dose of tannic acid given directly into the blood-stream is followed by its fairly rapid disappearance, it seems that continuous absorption is necessary to maintain a definite blood-level. Provided tannic acid can pass the surface barrier, the chances of keeping up such a blood-level might well be good with an often tanned burn. To test this possibility, we have carried out experiments in which skin areas of goats and rabbits were burned and treated by repeated spraying with 5% tannic acid. The burns were made under 'Nembutal' anæsthesia and involved about a twelfth of the total skin area in goats and an eighth in rabbits. The tannic acid content of the blood was followed for 6 days in goats and for 24 hours in rabbits (table VIII). Gallic acid was not detected after 4 hours' tanning, so the figures in this table may be regarded as true estimates of tannic acid in the plasma.

In the goat experiments, tannic acid was applied immediately after burning, as much of the dead epidermis as possible being scraped away first. This was difficult to do since the goat has a very tough hide and burning makes it even tougher. The tannic acid treatment was repeated daily for 3 days. Two of the goats showed tannic acid in their blood, one after 6 hours, the other at 24 hours. We were not able to follow the blood during the 6–24 hours interval. There may have been further positive results in that interval. None of these animals when killed after 6 days showed liver damage. It is possible that the two giving positive tannic acid tests may have shown changes in their livers in the early stages which cleared up by the 6th day.

The rabbit experiments were more successful, since it is comparatively easy to remove the burned skin and allow of efficient application of tannic acid. In these experiments, tannic acid was applied 5 times during the 7 hours following burning. Table VIII shows that each of 10 rabbits had definite amounts of tannic acid in the blood during the 24 hours after burning and tanning. When killed, many showed varying degrees of liver damage, although in no case was this as severe as after subcutaneous injection. Patches of liver-cell necrosis around the central veins were seen in rabbits 1010, 1012, 1014, and 1015; rabbit 971 showed much fat and commencing necrosis; rabbits 1011 and 1013 showed extensive fatty change but no necrosis; and rabbits, 972, 981 and 982 presented no liver abnormality (table VIII). Control animals with similar but untreated thermal burns have given no definite liver changes, beyond congestion of sinusoids around the centrolobular veins and some vacuolation and occasionally moderate fatty change.

We have also carried out some experiments with rats and obtained results very similar to those with rabbits.

There seems little doubt that even with not very extensive skin burns the application of tannic acid may be followed by its appearance and persistence in the blood and the development of slight or moderate liver damage. So far we have not had any fatal results, but this is most likely a question of extent of burn and amount of tannic acid applied. In none of our experiments has the blood level of tannic acid been high; the period of time over which tannic acid persists in the blood seems to be much more important in the production of injury.

The nature of the burn seems to play a part in determining whether absorption of tannic acid is likely. With severe burning and charring or heat-tanning of the skin, as in the goat, absorption takes place with difficulty. At a later stage, however, when the burn breaks down we have occasionally detected tannic acid in the blood. If burning is less severe and a raw surface is produced or if burnt tissue is completely removed and the exposed deeper tissues tanned, tannic acid seems to be absorbed without difficulty though in small amounts. In such cases, liver damage is likely to develop.

We conclude from these experiments that risks of tannic acid intoxication will arise when there is an extensive raw surface, or possibly exposed blood-vessels, and tanning is repeated in the early stages.

DISCUSSION

We have presented experimental evidence that in animals tannic acid has injurious effects upon the liver, capillaries and possibly upon the bone-marrow. After the introduction of small amounts of tannic acid directly into the blood-stream or large amounts into the subcutaneous tissues, animals show centrolobular necrosis in the liver, increased capillary permeability with leakage of plasma into the subcutaneous tissues, peritoneum, occasionally the lungs and possibly elsewhere, and leucocytosis. Production of a reservoir of tannic acid in the tissues, as by subcutaneous injection, leads to continued absorption of small amounts into the blood and a serious intoxication. Prof. W. C. Wilson (1942), we understand, has shown that the tannic acid protein complex in the circulating blood can exert injurious effects when introduced into normal animals. Tanning a burnt surface may also be followed by absorption of tannic acid, in small amounts it is true; with lapse of time the continual bathing of the liver cells with blood containing tannic acid results in damage and destruction of certain tissues. The injurious effect cannot be attributed to gallic acid, which is rapidly removed from the blood and can be tolerated in large amounts.

Other investigators have concluded that tannic acid is not without danger as a therapeutic agent. Much interest has been aroused by the paper of Wells, Humphrey and Coll (1942), who described prominent centrolobular liver necrosis in 4 cases of burns dying from toxæmia. Tannic acid baths were employed as part of the treatment. Subcutaneous injection of 5 or 10% solutions of tannic acid induced in rats some degree of liver damage which in general varied directly with the amount injected and the number of injection sites employed. All other organs examined appeared normal except for slight degeneration, cloudy swelling. The liver lesions included necrosis of the centrolobular cells, hæmorrhage and leucocytic infiltration in these areas, degenerative and nuclear changes in the peripheral zone of the liver lobules. We have heard, through private communication, of similar observations made by Pro fessor Wilson. Erb, Morgan and Farmer (1943) have recently recorded the post-mortem findings in 61 fatal cases of burns, 41 of which were treated with tannic acid the remaining 20 untanned.

Of the 41 tanned cases, 25 (61%) showed liver necrosi 9 of these cases presented microscopic evidence of severe an extensive liver damage (++++), 5 moderately sever (+++), 8 fairly extensive (++) and in 3 the lesion was n prominent (+). The shortest survival time in which necro was found was 60 hours, the longest 19 days. One case die in 60 hours, 17 cases in 3–5 days, 7 in 6–19 days. Signs o hepatic regeneration were seen in 5 patients who died betwe the 8th and 19th days.

Of the 27 tanned cases dying between the 3rd and 1 days, only 3 failed to show liver necrosis. One of these tanned 14 hours before death and in another the burned tanned area had been excised on the 3rd day, the child of sepsis on the 14th day. No case of liver necrosis occurr in the untanned group, 7 of whom died in the 3–14 days per in which necrosis was an outstanding feature in the tann group. Renal damage was observed in 19 cases, all but one which belonged to the tanned group.

These workers adopt a commendably conservative at tude towards the use of tannic acid, pointing out advantages which have followed its introduction concluding that liver necrosis is not necessarily the c of death, though it may be a serious complication.

Robinson and Graessle (1943) record experiments the toxicity of tannic acid.

They state that it is toxic for mice and rats tered intravenously or subcutaneously. In mice, for

ABLE VI—BLOOD "TANNIC + GALLIC ACID" OF GOATS AND RABBITS AFTER SUBCUTANEOUS INJECTION OF TANNIC ACID, AS 5% SOLUTION. Readings before injection were all negative

Dose mg./kg.	Animal	"Tannic + gallic acid" (mg./100 c.cm. plasma) after injection														
		hours						days								
		1	2	3	4	5	6	1	2	3	4	5	7	8	12	18
	Goat															
500	95	4·0	3·7	5·2	6·0	5·0	5·2	..	..	..		..	..	..	..	..
500	96	1·0	2·2	2·7	2·7	2·5	2·5	2·7	3·0	2·5						
100	97	0·75	..	..	0·85		..	0·62	0·25	0·42	0·55	0·22	0·23	0·25	0·11	0·14
100	98	0·20	..	..	0·6		..	0·24	0·15	0·24	0·36	0·40	0·30	0·30	0·16	0·12
100	122	0·24	..	..	0·12	..	0·24	1·0	1·2	..		..	..	..	..	..
100	123	0·90	..	..	0·37	..	0·24	0·63	3·2	..		..	..	..	..	..
50	124	0·24		..	0	..	0·12	0·24	0·62		..			..	..	..
50	125	0·24	..	..	0	..	0·12	0·37	0·87	..			..	..	..	..
25	126	0·12		..	0	..	0·12	0·62	0·74				..	..	..	..
25	127	0·12	..		0·12		0·37	0·62	0·87	..						..
	Rabbit															
100	1061	1·4	..		0·72		0·62	1·4			..				..	..
100	1062	0·9	..	..	0	..	0·12	1·0	..		..	..	..	..	..	..
100	1063	1·6	..		0·62		0·37	0·12	..	..		..				..
100	1064	2·6	..	..	0·9	..	0·74	0·37	..					..		..

Dose mg./kg.		Hours after injection (mg./100 c.cm. plasma)																													
		¼			1			2			4			6			24			48			72			96			120		
		G	GT	TA	G	GT	TA	G	GT	TA	G	GT	TA	G	GT	TA	G	GT	TA	G	GT	TA	G	GT	TA	G	GT	TA	G	GT	TA
300	Goat 352	0·6	1·5	0·9	1·6	2·5	0·9	0·7	2·0	1·3	0	1·5	1·5	0	1·0	1·0	0	1·7	1·7	0	2·2	2·2	0	4·2	4·2	0	4·2	4·2	0	3·5	3·5
	353	0	0	0	1·6	2	0·4	0	1·5	1·5	0	1·7	1·7	0	0·7	0·7	0	1·5	1·5	0	2	2	0	2·7	2·7	0	4·5	4·5	0	3·2	3·2

Dose mg./kg.		Hours after injection (mg./100 c.cm. plasma)																							
		¼			1			2			4			6			24			48			72		
		G	T	TA	G	T	TA	G	T	TA	G	T	TA	G	T	TA	G	T	TA	G	T	TA	G	T	TA
100	Rabbit 1750	0	2·2	2·2	0	5	5	0	1·5	1·5	0	1·2	1·2	0	1·1	1·1	0	1·0	1·0	Died	..	..			..
	1751	0	0·9	0·9	0	1·8	1·8	0	2·2	2·2	0	1·2	1·2	0	0·66	0·66	0	1·0	1·0	0	1·0	1·0	0	0·6	0·6
	1752	0	0·85	0·85	0	2·5	2·5	Died		..	..	..	..	..		..		..	..	..	..	..		..	..
	1753	0	1·5	1·5	0	2·3	2·2	0	2·0	2·0	0	1·1	1·1	0	0·85	0·85	0	0·1	0·1	0	0·2	0·2	0	0·2	0·2

G = gallic acid. GT = gallic + tannic acid (ferric chloride method). TA = tannic acid.

TABLE VII—BLOOD GALLIC ACID IN GOATS AND RABBITS *AFTER INTRAVENOUS (IV) AND SUBCUTANEOUS (S) INJECTION* OF GALLIC ACID, AS 3% SOLUTION

Readings before injection were all negative

Dose mg./kg.	Animal	Gallic acid (mg./100 ml. plasma) after injection										
		mins.				hours						
		1	5	15	30	1	2	3	4	5	6	24
	Goat											
10 IV	232	9·5	5·0	1·0	0	0	..	..	..	..	..	..
10 IV	233	10·0	4·5	1·5	0	0		..	..	..	..	..
100 S	234	..	..	1·0	3·0	6·0	7·5	3·5	1·5	0·5	0	0
100 S	235			1·0	5·5	7·3	5·0	2·7	1·3	0·5	0	0
	Rabbit											
100 S	1123		..	5·0		10·0	3·7	..	0·5	..	0	..
100 S	1124	..	..	5·0	..	8·1	2·5	..	0·5	..	0	..
100 S	1125			6·0	..	8·0	3·0		0·2		0	
100 S	1126	..	..	2·7	..	11·0	7·5	..	6·5	..	5·0	K

K = killed.

he oral fatal dose lies between 3 and 4 g. per kg. body-eight ; *in contrast* 60 mg. per kg. intravenously killed 18 of 0 mice ; 40 mg. per kg. killed 7 out of 20. The minimal thal dose for subcutaneous injection is between 125 and 150 ig. per kg. When applied to the deep subcutaneous tissue llowing surgical removal of the skin, tannic acid is lethal mice but not to rats or rabbits. Liver damage shown by creased retention of bromsulphalein resulted in rabbits from [illegible]

nuded skin surfaces. These workers note that none of the xic signs produced by tannic acid are seen after large doses gallic acid.

Rossiter and Barnes (1943) have demonstrated the xicity of tannic acid and sodium tannate in mice and uineapigs after intravenous and subcutaneous injection. iver degeneration or necrosis was the outstanding

. Forbes and Evans
atotoxic effect" of
g and Maun (1943)
ic damage caused in
forming an eschar.

ic acid
comes
ercised
lusions
gation
is offered as a contribution, in the first instance, to toxicology, though we have tried to design experiments

TABLE VIII—BLOOD "GALLIC + TANNIC ACID" AFTER TANNING THERMAL BURNS INVOLVING A TWELFTH OF THE TOTAL BODY SURFACE OF GOATS AND AN EIGHTH OF RABBITS

Readings before tanning were all negative

Animal	"Gallic + tannic acid" (mg./100 ml. plasma) after tanning								
	hours			days					
	2	*4*	*6*	*1*	*2*	*3*	*4*	*5*	*6*
Goat									
102	..	0	2·0	0	0	0	0	0	0
103	..	0	0	0	0	0	0	0	0
118	..	0	0	0·5	0	0	0	0	0
119	..	0	0	0	0	0	0	0	0
Rabbit									
971	..	0	..	0·5	..	..	..	..	..
972	..	1·0	..	1·1	..	..	..	..	..
981	1·0	0·2	..	0	..	..	..	..	..
982	1·0	0·7	..	0	..	..	..	..	..
1010	2·7	1·7	1·6	0	..	..	..	..	..
1011	1·9	1·6	1·6	0·9	..	..	..	..	..
1012	1·0	0·8	1·2	1·0	..	..	..	..	..
1013	0·9	0·6	2·2	1·0	..	..	..	..	..
1014	1·6	1·4	1·0	1·6	..	..	..	..	..
1015	1·6	1·2	1·9	1·1	..	..	..	..	..

Goats tanned immediately after burning and at daily intervals for 3 days.
Rabbits tanned 3 times during the first 7 [illegible] burning.

which have some bearing on the practical treatment of burns. We recognise that the ultimate decision for or against the tannic acid method must come from human experience, and we note with some dismay that evidence is already accumulating which suggests the need for critical revision of this treatment.

SUMMARY

When tannic acid is administered subcutaneously or intravenously to animals it persists in the blood for some time, inducing hæmoconcentration, loss of plasma proteins, leucocytosis and severe liver damage. These effects are not due to gallic acid.

The application of tannic acid to large burnt skin surfaces of animals may be followed by its absorption and subsequent liver injury.

Our thanks are due to the Director-General, Scientific Research and Development, Ministry of Supply, for permission to carry out and publish this investigation. We also wish to thank Prof. R. A. Peters, FRS, Dr. F. C. Courtice, and Messrs. F. Burgess and J. P. Rutland for valuable assistance; and we are grateful to Surgeon Captain A. Fairley, RN, who provided us with facilities for our work. The Director-General, Army Medical Services, has kindly allowed us to refer to the unpublished reports by Lieut.-Colonel W. C. Wilson, RAMC.

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FORMATION OF RED BLOOD CORPUSCLES

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(*Illustrations on Plate*)

SINCE writing my previous article[1] I have made further investigations into blood development, and it now seems to me that the blood is made up in two different ways by an intra-uterine process and an extra-uterine process.

INTRA-UTERINE PROCESS

In the fœtus the mononuclear cell which has been described as the nucleated red corpuscle is not regular in size or shape and the cells have irregular protoplasm. In some of the cells the protoplasm is the size of two or three red corpuscles. From the protoplasm of these various cells are extruded the globules of hæmoglobin which are the anucleated red corpuscles. In figs. 1 and 2 (see plate) it can be seen that there are different types of nucleated red corpuscles, each having different irregularities in the protoplasm, and in fig. 2 *d* I have been lucky enough to photograph a cell which is extruding an anucleated red blood corpuscle. Under the microscope it can be seen that the protoplasmic remnant with the nucleus has the same pink colour as the anucleated red blood corpuscles.

I think this intra-uterine cycle of blood formation is a minor one, in which the protoplasm of the mononuclear cell grows and eventually extrudes some protoplasmic portion which becomes the anucleated red blood corpuscle. After an unknown number of cycles have been completed it seems that the nucleated remnant may become a lymphocyte, because the body needs to build up a large store of lymphocytes. We shall see later how this becomes important in extra-uterine blood-formation.

Possibly the extra-uterine mammal is also able t secrete red corpuscles on a small scale in the bon marrow, by the same process as the intra-uterine formation, and this process becomes more active in som diseases, with hypertrophy of the marrow.

EXTRA-UTERINE PROCESS

In my first article I mentioned that the eosinoph played an important part in blood formation; but was only able to allow it a symbiotic part in the cycl because I had no evidence to the contrary. Recentl however, I came across a rare case of a sarcoma of th stomach (fig. 8) which will be described elsewher Studying a slide made from this tumour, under low power, I saw a large quantity of free blood. It is we known that some of the blood in the sarcomas is n contained within capillary walls. By investigating th slide carefully under oil-immersion I was surprised to fi that the area of free blood contained a large number granules of different sizes which were grouped togeth in different accumulations but all having the sa affinity for eosin. The size of these granules varied fro the size of those contained in the eosinophil polymorp to the fully developed and typical red blood corpuscl (fig. 5). There were also many cells of different siz each containing a different number of granules in variou stages of evolution (fig. 3). I could see clearly cell which had burst and expelled the red blood corpuscle the remaining nucleus of the cell becoming a lymphocyt (fig. 6, *a* and *b*).

This discovery of the evolution of the red corpuscle from the granules of the eosinophil was so unexpecte that I wanted more confirmation before I was prepar to accept it as a fact. But after careful observation o different tissues in which hæmopoiesis was evident particularly in a carcinomatous lymphatic gland, realised that there could be no doubt about it whateve

The secretion of the red corpuscles can be observed mo easily in pathological tissues than in normal hæmopoieti organs. There are two explanations for this: one is that in the hæmopoietic organs the very large number of cell present blur the microscopic picture and make detail observation difficult; the other that the acid used for d calcification of bone-marrow produces a change in the cel which, when stained, do not give a very clear or microscopic picture. In a small aberrant sple found at an autopsy I discovered it was easier to se different cells secreting red blood corpuscles than it was in t

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[1] See *Lancet*, 1943, i, 513.

Legends to Illustrations

PROF. CAMERON, MR. MILTON, MR. ALLEN

FIG. 1—Liver 24 hours after subcutaneous injection of 1000 mg./kg. tannic acid (guineapig 37). Extensive centrolobular necrosis. Hæmatoxylin and eosin. (× 35.)

FIG. 2—Liver 3 days after subcutaneous injection of 500 mg./kg. tannic acid (goat 16). Massive necrosis with small islands of persisting normal tissue at periphery of lobules. Hæmatoxylin and eosin. (× 35.)

FIG. 3—Liver 4 days after subcutaneous injection of 500 mg./kg. tannic acid (goat 13). Massive centrolobular necrosis. Regeneration beginning in peripheral surviving tissue. Hæmotoxylin and eosin. (× 35.)

FIG. 4—Liver 6 days after subcutaneous injection of 1000 mg./kg. tannic acid (guineapig 13). Shrinking centrolobular necrosis with regeneration. Much fatty change in normal liver tissue. Hæmatoxylin and eosin. (× 35.)

FIG. 5—Liver 6 days after subcutaneous injection of 500 mg./kg. tannic acid. Well advanced liver-cell regeneration with shrunken areas of necrosis (guineapig 8). Hæmatoxylin and eosin. (× 35.)

FIG. 6—Liver 8 days after subcutaneous injection of 500 mg./kg. tannic acid. Regeneration almost complete. Hæmatoxylin and eosin. (× 35.)

DR. DURAN-JORDA

FIGS. 1 and 2—Intra-uterine red corpuscle format (from 2·5 mm. human embryo): 1 (*a*) and (*b*) nucle plasmic remnants after red corpuscle formation; nucleated red corpuscle (extravascular). 2 (*a*, intravascular red corpuscles of different sizes; anucleated red corpuscle (extravascular).

FIG. 3—Gastric sarcoma showing intracellular blo Eosinophil cells in different stages of evolution.

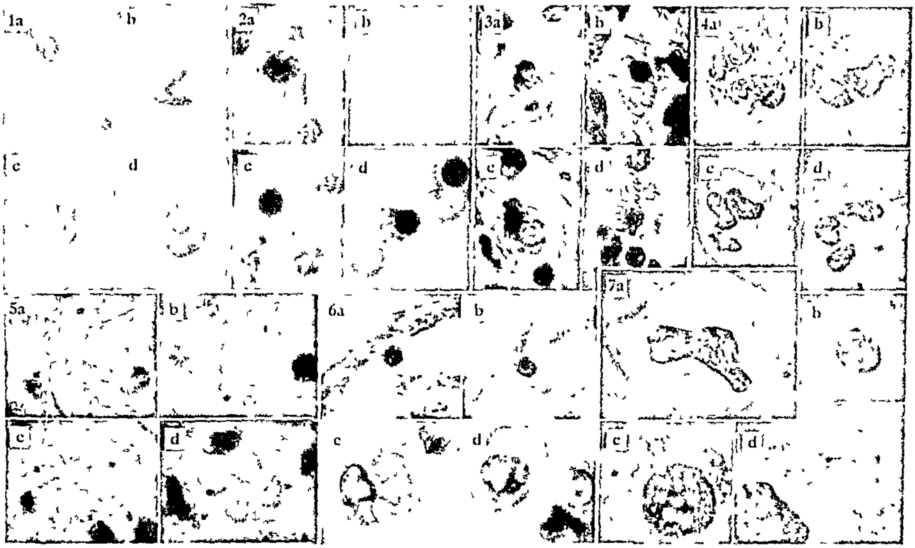
FIG. 4—Angioma. (*a*), (*b*) and (*c*) different stages of polymorph; (*d*) control picture of eosinophil in the periph blood of the same patient.

FIG. 5—Gastric sarcoma. Evolution of red corpus granules of the eosinophil.

FIG. 6—(*a*) and (*b*) gastric sarcoma; nucleated remna cyte. (Both pictures taken from same field u microscopical focus.) (*c*) and (*d*) Aberrant s forming blood. (Similar pictures have been regard phagocytosis of red cells.)

FIG. 7—Angioma. (*a*) Nucleus of a transitional c platelet; (*c*) Turck cell containing eosinophil (*d*) mononuclear cell with empty vacuoles inside resembles an accumulation of platelets in places.

DR. DURAN-JORDA: FORMATION OF RED BLOOD CORPUSCLES



PROF. CAMERON, MR. MILTON, MR. ALLEN: TOXICITY OF TANNIC ACID

WING-COMMANDER ARMSTRONG: BONE-GRAFTING

1– 2 Established non-union. (24 months after fracture.)
3 Malunion, with tilting of the inferior articular surface of the tibia. (18 months after fracture.)
4– 5 Failure of reduction. (9 weeks after fracture.)
6– 7 Same case after grafting.
8– 9 Failure of reduction, including traction. (6 weeks after fracture.)
10–11 Same case after grafting.
12–13 Gap due to comminution.
14–15 Gap due to too extensive debridement.
16–17 Delayed union. (14 weeks after fracture.)
18–19 Same case after grafting.
20–21 Delayed union. (After 25 weeks in plaster.)
22–23 Same case after grafting.
24–25 Same case a year after operation.

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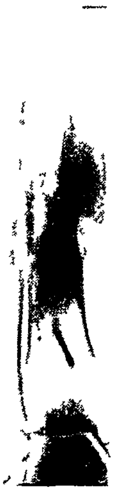

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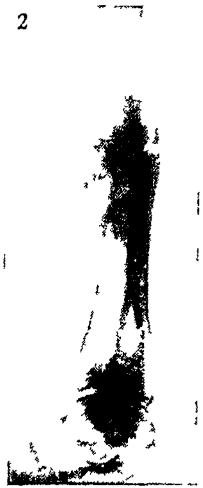

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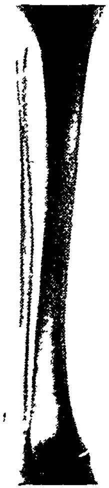

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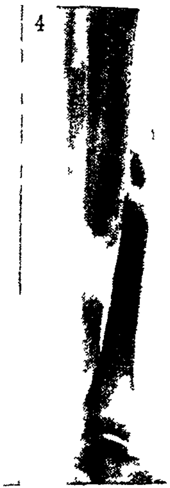

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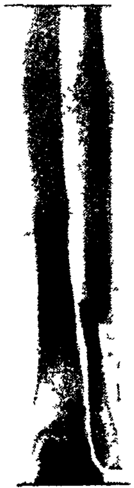

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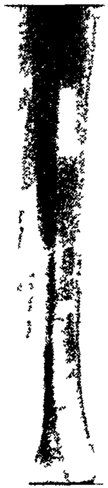

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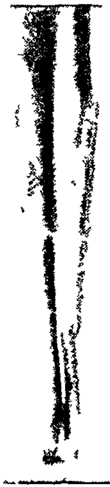

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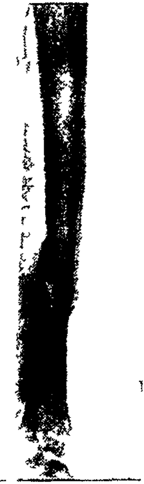

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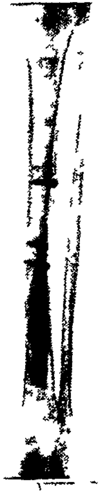

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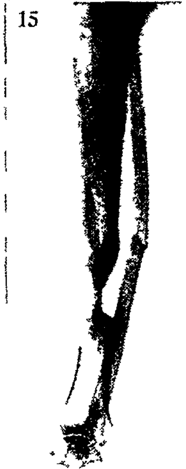

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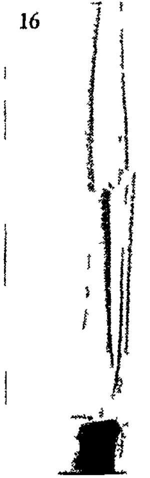

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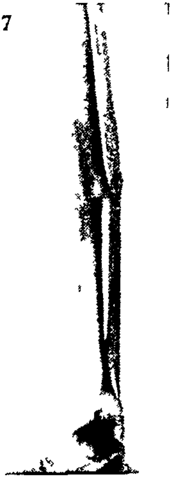

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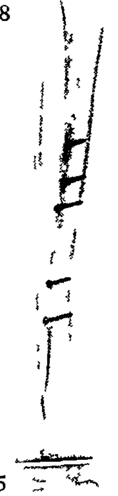

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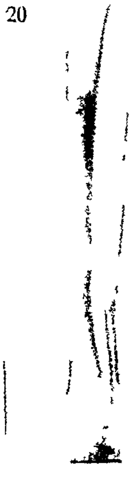

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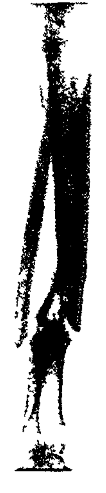

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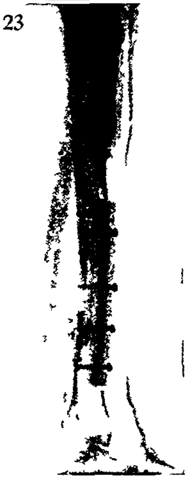

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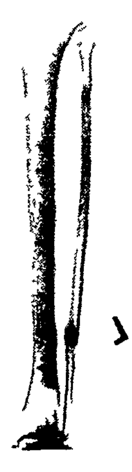

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spleen of the same patient (fig. 6, c and d). Blood-forming cells can be seen in rabbit spleens by obtaining a little of the pulp from the spleen and diluting it with formal-saline, afterwards making a wet film for observation under high magnification.

Since there are blood-tumours which are not connected with the general circulation, classified as angiomas, I thought that possibly a study of them would help me to [illegible] gastric sarcoma. I [illegible] of the calf of the leg, [illegible] puncture of a vascular dilatation of a bluish colour, and by staining some of the smears obtained with May-Grunwald-Giemsa. The blood differs strikingly in colour and thickness from capillary blood obtained from the surface of the tumour after resection. The differential count obtained from the blood tumour was as follows: polymorph eosinophils [illegible] phils 3%; lymphocytes 54%; [illegible] there was a total absence of [illegible] from any group, either normo- [illegible] megaloblast. The pictures of the angioma, (figs. 4 and 7) give a good idea of the extensive damage produced in the cells by the spreading of the smear. The same damage occurs in smears obtained from routine sternal puncture.

The differential count of the tumour blood, which does not contain any neutrophil polymorphs, is in striking contrast to the differential count of the patient's peripheral blood: neutrophil polymorphs 53%; lymphocytes 34%; mononuclears 13%. The eosinophil polymorphs in the blood of the tumour showed clearly how the eosinophil granules swell; but some of the cells had lost a large number of eosinophil granules owing to the destruction produced by the smear, and only a few remained in the protoplasm. Other cells were without granules at all, but it was possible to see the shape of the granules in the protoplasm where they had been before they were destroyed by smearing (fig. 1, a, b and c).

Some of the mononuclear cells still contained the full- [illegible] red corpuscles and others contained some swollen [illegible]inophil granules, but a large number of the cells had [illegible]pty vacuoles in the protoplasm where the red cor[illegible]scles had been present before they had been damaged [illegible] the smear. The nuclei of these mononuclear cells [illegible], varying from the [illegible]) to that of a typical [illegible]ossible to see clearly [illegible] as a Türck cell with [illegible] 7 c). The differing [illegible] nuclei can be attri[illegible]e tumour-disturbed [illegible]een in intermediate [illegible] borne out by the [illegible] have not developed [illegible]o full-size red corpuscles. The final stage in this [illegible]mopoiesis is the evolution of the nucleus as a lympho- [illegible]

[illegible]ucture as the platelets, fig. 7 d, and there were some [illegible]dies present of the same size as the red corpuscles [illegible]ich could easily be taken for giant platelets (fig. 7 b). [illegible] [illegible]veloped red corpuscles; and the different kinds of [illegible]maining nuclei from the cells help to maintain the [illegible]onophyletic theory of blood-cell formation, which [illegible]til now did not include the formation of the red [illegible]rpuscles.

ORIGIN OF THE EOSINOPHILS

The [illegible] [illegible]iginat[illegible] [illegible]n are[illegible] [illegible]uring routine examinations of bone-marrows I found [illegible]at between the myeloblast and the eosinophil myelocyte stage is missing where the number of protoplasmatic [illegible]sinophil granules in the cell should be gradually [illegible] myelocytes are always full of [illegible] them being coarser than the [illegible] polymorphs present in the [illegible]me bone-marrow. It has also been observed that in eosinophilic leukæmias most of the eosinophils in the peripheral blood as well as in the bone-marrow are polymorphonuclear and that myelocytes are extremely few.

I discounted the current theory of eosinophil polymorph formation from the myeloblast through the eosinophil myelocyte in the bone-marrow, and began to study instead the possibility of its being formed by the evolution to eosinophil granules of the neutrophil granules found in [illegible] When stained with Leishman [illegible] some blood films show neu[illegible] to classify as such, because it is hard to distinguish them from eosinophilic granules. To differentiate the granules of the eosinophils more [illegible]al blood and bone-marro[illegible] (hæmatoxylin and eosin). [illegible] staining any granules oth[illegible]

I was careful not to overstain the sections and blood-slides with eosin since this makes the supporting tissue very red and blurs the slide. The method differs from the classic [illegible]–30 [illegible] 1–2 [illegible], by [illegible] and [illegible]osin [illegible]ort- [illegible] not camouflaged.

I was readily satisfied that the neutrophil polymorph in the peripheral blood and bone-marrow is not connected in any way with the eosinophil group. It then became necessary to analyse other organs to find the origin of the eosinophil cells. The spleen was immediately ruled out by the fact that splenectomy is followed by an [illegible] of these cells in the [illegible] pituitary, which show [illegible] also ruled out because [illegible] possible connexion with the eosinophil leucocytes.

There is a group of organs in the body, however, where eosinophil cells a[illegible] and also in some [illegible] of these cells is [illegible] physiological text[illegible] them are the sto[illegible] organs, as is well [illegible] cytes, some of w[illegible] Peyer's patches.

In the gastric mucosa, the number of eosinophil cells present in a section of 5 microns is approximately 5 cells per gland tubule[2]; and as there are about 35 million glands in the gastric mucosa it can be estimated that there are at least 175 million eosinophil cells in this organ alone. The [illegible] intestinal mucosa. [illegible] it is simple to foll[illegible] cells of the lymph[illegible] granules to mononuclear cells which have a large number of granules inside. It is also possible to see in these mucosas a nuclear karyokinesis which transforms the rod-shaped nucleus of the mononuclear cell into that of a polymorph.

In the intestinal mucosa the lymphocyte becomes fixed and makes up eosinophil granules, the cell at this stage having the appearance of what is known as the Paneth cell; this eventually shrinks until it becomes the size of a fully developed eosinophil polymorph which is then ready to wander in the tissues and pass through the wall of a lymphatic or capillary vessel; nature [illegible] [illegible]ause the [illegible]e nuclear [illegible]

When the eosinophil polymorphs, with lobulated nuclei, have developed from the lymphocytes they enter the circulation and drift towards the hæmopoietic organs or to any tissues suffering from pathological processes. In these sites they secrete the red corpuscles, and the remaining protoplasmic nuclei become lymphocytes again, as the studies of the blood of the angioma and sarcoma showed.

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[2] All microscopical studies are done in two dimensions only—length and breadth. This estimation of approximately 5 cells per gland means that these are the cells seen in a section of 5 microns; accepting the gland as a cone the number of cells should be larger.

This hæmopoiesis is always seen in the presence of plasma cells and eosinophils. For this reason, not knowing that the red corpuscles were evolved from the eosinophils, I took the plasma cell to be the parent of the red corpuscles. Now that I am in possession of different facts I conclude that those plasma cells which have eosinophilic granules in the protoplasm are the equivalent of the eosinophil myelocyte in the spleen and bone-marrow. As yet, however, I cannot say whether the plasma cells without eosinophil granules are the nucleated protoplasmic remnants passing through an intermediate stage after forming red corpuscles, or whether they have another function.

Until now blood has been studied as a static tissue, and the differential count interpreted as a permanent picture of a fixed proportion of cells contained in the circulating blood. Because of this, some may ask how is it possible to explain the full development of the red corpuscles from the eosinophil cells when the eosinophils are normally present in the peripheral blood as only 2% of the white corpuscles? I can only point out that the same applies to the chemical components of the blood, and if these were also accepted as being in a static state it would be impossible to understand where the 2000 calories come from which the body needs daily when there is such a small quantity of proteins, fat and glucose in peripheral blood. These chemical products must be in a dynamic metabolism; if we accept the blood-cells as also being dynamic, then knowing that the blood circulates all over the body in less than a minute, it is easy to understand how the circulation, with 7000 white cells per c.mm. and 2% eosinophils can carry, theoretically, during one day, about 200,000 eosinophils per c.mm. Fig. 9 shows how the cells are constantly changing in the same patient over a period of 17 hours. Every eosinophil contains more than 60 granules, and if all these developed every day, the result would be the daily production of about 12 million red corpuscles per c.mm.; the eosinophil cell could be responsible for the formation of all red corpuscles.

SUMMARY

The lymphocytes in the gastric and intestinal mucosas, by karyokinesis of the nucleus become fully developed eosinophil cells after an intermediate stage as Paneth cells. The fully developed eosinophils wander to the blood-stream and to the hæmopoietic organs, carrying the preformed red corpuscles. In the hæmopoietic organs they develop their complete function of secreting the red corpuscles, expelling the protoplasmic remnants which are the platelets; the remaining nucleus becomes a lymphocyte again. The lymphocytes probably then return from the hæmopoietic organs to the gastric and intestinal mucosas, so completing the extra-uterine cycle of red corpuscle formation.

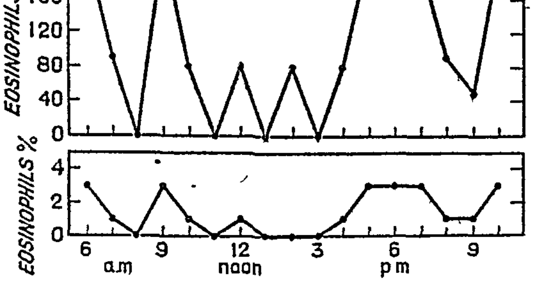

Fig. 9—Eosinophil counts in a single subject over 17 hours

CONCLUSIONS

There are two processes of blood formation, here described as intra-uterine and extra-uterine.

The eosinophil polymorph is the carrier of preformed red corpuscles from the gastric and intestinal mucosas to the hæmopoietic organs in normal conditions, or to other tissues and organs in pathological conditions.

The lymphocyte, through the intermediate stage of Paneth cell, becomes an eosinophil cell in the gastric and intestinal mucosas.

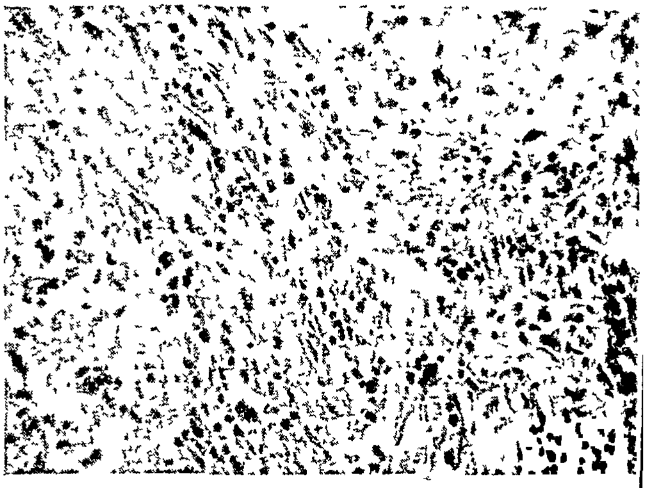

Fig. 8—Gastric sarcoma, showing hæmopoiesis

The granules of the eosinophil cell are preformed red corpuscles.

After bursting and extruding the red corpuscles th mononuclear remainder of the eosinophil cell becom a lymphocyte.

The eosinophil myelocyte of the bone-marrow is no a predecessor of the eosinophil polymorph, but its successor.

The gastric and intestinal mucosas are the organs whe the blood is formed.

I would like to thank Prof. F. Wood Jones for his he criticism and discussions; Mr. J. B. Dean, B SC, who ha done all the photomicrographs in connexion with this wor my technician, Mr. Butcher, for his help with histolog work; and my secretary.

BONE-GRAFTING

IN THE TREATMENT OF FRACTURED TIBIA AND FIBULA

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(*Illustrations on Plate*)

FRACTURES of the shafts of the tibia and fibula comparatively common injuries, with certain chara istic features. These features include a tendenc re-displacement after an initial accurate reduct frequent slow union leading to non-union if unrecogn and disability, often serious, if the fractures are allo to unite in imperfect alignment or with rotational placement (Watson-Jones 1940). For these reasons not surprising that the results of treatment are q imperfect, especially as there appears to be a tend to regard these fractures as relatively simple inju Treatment by open operation is, however, only necessary, particularly if adequate conservative met are employed from the outset. It must be emphas that, heavy though the penalty of failure of conserva treatment may be, the result of failure of opera treatment may well be tragedy.

INDICATIONS FOR OPEN OPERATION

There are four *absolute indications* and two *rel* *indications* for operation. The absolute indications

1. *Established non-union.*—When the fractured faces have become sealed off by a layer of dense scler bone no form of conservative treatment will resul bony union. Figs. 1 and 2 (on plate) show a 24-mon old fracture which had been treated in plaster for months, followed by drilling the bone ends and pla for a further 6 months. Removal of the plaster followed by increasing pain and disability, and the grams show an ununited fracture with sclerosis of bone ends. The drill fragment is a legacy from previous operation elsewhere.

2. [illegible] *to cause serious disability*— such [illegible] only be relieved by divisio

the bone and correction of the deformity. Fig. 3 shows a fracture 18 months old which has resulted in gross tilting of the inferior articular surface of the tibia. Osteotomy and correction of this tilting much improved the function of the leg

3. *Failure to obtain adequate reduction by conservative methods*—Recent fractures can almost always be accurately reduced by a combination of manipulation and traction, the procedure being much facilitated by the use of a Zimmer or Watson-Jones traction apparatus. Reduction becomes increasingly difficult later, and, if more than a month has elapsed since injury, may be impossible using conservative methods only. Figs. 4 and 5 show a 9-weeks old fracture, which had been treated by immobilisation in back and side splints for 7 weeks, followed by application of plaster-of-paris. It is unlikely that the degree of overlap present could be corrected by traction alone, but by operative reduction and grafting normal apposition and alignment can be secured (figs. 6 and 7) Occasionally accurate reduction is prevented by interposition of soft tissue between the bone ends. Figs 8 and 9 show an oblique fracture 6 weeks old, after treatment by manipulation and plaster, followed by traction on a Braun's splint with a pin through the os calcis and later a further manipulation and plaster. At operation the upper end of the lower fragment was found to have penetrated the periosteum, and the bone ends were separated by a periosteal flap which had to be divided before reduction could be obtained.

4 *Loss of bone sufficient to prevent union or to delay it unduly.*—This is most commonly seen in fractures caused by a missile travelling at a high velocity, and after a too enthusiastic debridement of a compound fracture. Occasionally a simple fracture of the tibia is associated with much comminution of the bone ends, and displacement of some fragments leaves a considerable gap to be bridged by callus (figs. 12 and 13). Figs. 14 and 15
how a 7-months-old compound fracture treated by
xcision and debridement of the wound. The resulting
gap has only been crossed by a slender bridge of bone,
nsufficiently strong for weight-bearing.

The two relative indications for operation are .

1. *Delayed union in certain circumstances.*—In some
ractures union may be long delayed. Interference with
lood-supply, inadequate immobilisation, and distraction
only three of the possible causes of such delay. In
ne of these fractures it may be justifiable to hasten
ion by bone grafting. Figs. 16 and 17 show a 14-weeks-
l fracture in which only about half the bone ends are in
position, although the fragments are in satisfactory
gnment. There was no clinical evidence of union, and
callus formation is seen in the radiograms. Figs 20
d 21 show a 31-weeks-old fracture treated in plaster
r 25 weeks. Removal of plaster was followed by symp-
ms and the radiograms show that the fracture is not
undly united. Both these fractures were treated by
ne-grafting.

pes of
a loose
aintain
Such
mbina-
on of internal and external fixation.

There are two *contra-indications* to operation. The
st is local infection i
ne, or other tissues,
the body, fracture
on of bone should be approached with special care,
membering how often an apparently subsided focus
ll "flare" after an operation. The second is any
ubt at all of the absolute efficacy of the theatre
chnique available Unless the aseptic technique is
mpletely reliable, operation is unjustifiable.

AIMS AND METHODS OF BONE GRAFTING

Three essential results should follow an ideal operation .

Restoration of the normal relationship between the bony
gments

Mechanically stable fixation of the fragments in normal
ationship

The establishment of conditions most favourable for sub e-
ent union by bone

ny types of operation fall short of these requirements.

Simple reduction after "freshening" or drilling bone ends is not mechanically stable and displacement may recur. Reduction and fixation with screws or plates of 'Vitallium' or other material does not produce conditions as favourable for union as is the case with procedures

massive grafts of autogenous bone fixed by screws. In this way a very stable fixation is produced, there is no danger of the screws working loose due to bone absorption, or adversely affecting the process of bony union, and no fear of subsequent ill effects due to the presence of an ionisable metal in the tissues.

The tibia, easily accessible and roughly triangular in section, with flattened anteromedial, anterolateral and posterior surfaces, would appear to be an ideal medium for any of the various grafting techniques. In practice, however, several difficulties arise, and it is not easy to devise a technique which is simple, applicable to all types of fractures, and requires a minimum of instruments and dexterity on the part of the surgeon.

Inlay grafts.—One of the most commonly practised methods is the use of an inlay graft on the readily accessible anteromedial surface of the bone It is extremely difficult to make an inlay graft fit its bed so snugly that the cortical element of the graft coincides exactly with the cortex of the tibia (fig. 26 *a*). Unless the graft fits so closely that considerable difficulty is experienced in "springing" it into its bed it tends to sink into the medullary cavity of the tibia, especially when the retaining screws are being driven home (fig. 26 *b*). "Springing" a closely fitting graft into its bed is not without its difficulties. Grafts have been broken and bones split during this manœuvre. An ideal inlay graft should be cut with a bevelled edge (fig. 26 *c*). This
, it much
required.
medullary,
and, while excellent results are often seen, non-union is more frequent with intramedullary than with other types of autogenous grafts (Campbell 1939a) Moreover, a much more extensive process of repair is necessary to restore the bone to normal than when the graft is so placed that the structure of the bone approximates to normal at the end of operation.

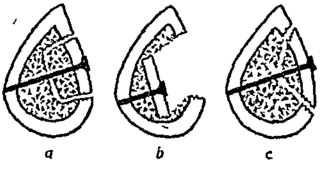

Fig 26—A bevelled edge prevents the inlay graft from sinking into the medulla

A second difficulty arises in connexion with the alignment of the tibial fragments. The anteromedial surface of the tibia is not flat but curved, the degree of curve varying from individual to individual and being greatest at the junction of the upper and middle, and middle and lower thirds (fig. 27 *a*). These points are common sites of fracture, and if a sliding graft cut from the middle third is used, and so placed that the cortex of the graft

into the medullary cavity if normal alignment of the bone as a whole is to be maintained (fig 27 *c* and *d*). It is not

strength

of the graft. Even if the very largest possible graft is used and fixed with screws, where the graft crosses the fracture line is always a weak area in the reconstructed bone. Even moderate violence would fracture the graft at this point, and absorption of a graft, insufficiently protected by external fixation, in the line of the original fracture is by no means unknown.

Onlay grafts.—A massive sliding onlay graft consisting of the whole anteromedial surface of the tibia may be used. This method is open to the objection discussed in connexion with sliding inlay grafts—the curve of the graft is often insufficient to produce normal alignment of the tibial fragments. An onlay graft cut from the sound tibia and placed far back on the anterolateral surface of the tibia has been advocated by Campbell (1939b). To have the required curve such a graft should be cut from an area on the sound tibia exactly corresponding to the graft bed, not an easily accessible place from which to cut a graft.

Massive sliding graft: the "split-bone" technique.—I have found the use of a massive sliding graft consisting of half the tibia, on the principle described by Gill (1932) in connexion with the radius and ulna, an improvement on either of the previous methods. The tibia is exposed subperiosteally along its whole length, the fracture is reduced and held so that the fragments are in normal relationship, and the bone is split in two along about half its length in such a way that two-thirds of the divided area is on the longer, and one-third on the shorter, fragment. The bone is divided approximately at its centre and the anterior fragments removed (fig. 29). The longer fragment is laid across the fracture and fixed in position with vitallium screws, and the gap left is filled with the shorter fragment (fig. 30).

The advantages of this technique are as follows:—

1. A very massive graft, producing a mechanically stable fixation, is used.

2. Any sclerosed areas of bone around the fractured surfaces are widely opened up.

3. Large areas of raw bone on the graft and host are brought into close and stable contact, producing conditions favourable for rapid revascularisation of the graft.

4. It is very easy to correct any tendency to malalignment, particularly the medial or lateral bowing which often causes difficulties when other methods are used.

5. The shape and structure of the reconstructed bone approximates to normal, reducing to a minimum the amount of bone absorption and new bone formation necessary during repair.

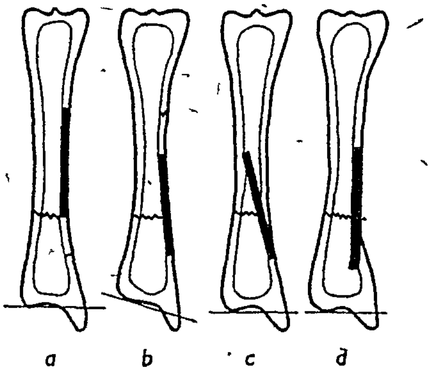

Fig. 27—Difficulties arising from curvature of the tibia.

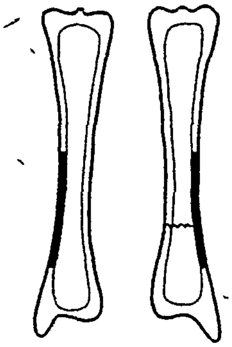

Fig. 28—Inlay graft taken from opposite tibia.

6. The injured leg only is involved. Although it is completely justifiable to use the opposite tibia as a source of graft when necessary, it is an advantage to use a technique which renders this unnecessary.

TECHNIQUE OF OPERATION

The skin is prepared in the usual way, and a tourniquet of the Esmarch type is used. The skin incision extends the whole length of the tibia over the middle of its subcutaneous surface. The periosteum is incised in the line of the skin incision and stripped from all surfaces of the bone. By clearing areas above and below the fracture first and then cautiously stripping the more adherent areas it is possible to expose the whole bone without tearing or damaging the periosteum. Bone [illegible] passed between the posterior surface of the bone and the periosteum and slid to the end of the incision act as convenient retractors. The fractured surfaces are cleared of fibrous tissue, as little bone as possible bein sacrificed during the process. The fibula is next re fractured or if necessary divided subperiosteally. Thi *is a most important step if the presence of an intact fibula prevents accurate alignment of the tibial fragments.* The fracture is reduced, care being taken to align the fragments correctly, and the tibia is held firmly by clamps applied between the posterior surface and the periosteum, so that the anterior two-thirds of the bone is left free. *Using a large diameter single saw th* bone is split as shown in fig. 29. If a saw of 1¾ inch diam- eter is used it is possible to divide one cortex, cross th medullary cavity, and partly divide the opposite cortex with a single cut (fig. 31). If a larger blade is availabl the bone can be completely divided. The longitudin cut is made first, care being taken to keep parallel to th posterior surface of the tibia. The end cuts are then completed and the anterior half of the bone is detached by completing the division of the cortex on the antero- lateral surface, using a chisel inserted through the media saw cut. The longer fragment is laid across the fractur held with clamps, and, after drill holes have been mad through graft and bone, fixed in position with vitallium screws. The shorter fragment is placed in the gap lef by the shift of the longer fragment and fixed with a singl screw.

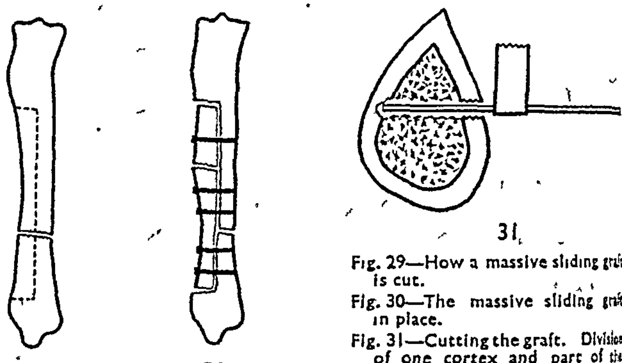

Fig. 29—How a massive sliding gra is cut.

Fig. 30—The massive sliding gra in place.

Fig. 31—Cutting the graft. Division of one cortex and part of th other.

The leg is covered with a sterile towel and antero posterior and lateral radiograms are taken to confirm satisfactory alignment of the tibial fragments. If th longitudinal cut has been made parallel to the posteri surface of the bone, anterior or posterior bowing i prevented by the graft which lies flat on the cut surfac of each fragment. Should any such bowing be show by the radiograms the graft is removed, the bed of the appropriate fragment is smoothed with a chise to an extent sufficient to correct the bowing, a the graft is replaced. In practice, however, I ha had no difficulty on this score. The much common and more important medial or lateral bow can, if present, be simply corrected by removing lowest screw, angling the lower fragment as much necessary, and reinserting the screw. The indiv variation of the normal bowing of the tibia makes difficult to be certain of correct alignment in all ca *without radiograms, so these should never be* at operation. A slight angulation which, if dete then, can be corrected in a few minutes, presents different problem if first revealed by radiograms t few days after operation.

When a satisfactory reduction has been confirm skin and periosteum are closed, and a plaster is from the metatarsal heads to the groin, due att being paid to correct moulding over the longitudin transverse arches of the foot. Either a lightly r or an unpadded plaster may be used. My own cus to use an unpadded plaster over stockinette, a begin toe, quadriceps and leg-raising exercises th after operation. There is some swelling in the s 24 hours after operation, but in my experience this serious and has never necessitated bivalving the pl If a padded plaster is used it should be replaced unpadded plaster two weeks after operation, leg-r exercises being omitted until after this has been An unpadded plaster need not be changed for 6 after operation. The patient is allowed to sit up

chair 2 weel g on
crutches 2–3 'aster
is not permitt

Toe, quadriceps, and leg-raising exercises are carried out from the first, at least ten minutes every hour, being
dually increasing the
capable of practising
suspended from the

Immobilisation in plaster from toes to groin is continued until there is clinical and radiological evidence of sound bony union. When union is firm the plaster is removed, a supporting bandage applied from toes to knee, and the patient is instructed in exercises to restore full mobility to the foot, ankle and knee. These final stages of treatment are best carried out in an organised rehabilitation centre, where the necessary mobilising exercises and a graded return to full activity can be carried out under expert supervision in a pleasant and psychologically stimulating atmosphere and environment.

Figs. 10 and 11, 18 and 19, and 22 and 23 show the fractures in figs. 8 & 9, 16 and 17, and 20 and 21 after grafting by the technique described, and figs. 24 and 25 show the normal appearance of the tibia a year after the operation.

CONCLUSION

The operative method described can be applied to any fracture of the shaft of the tibia except those within 2½ inches of the upper or lower joint surfaces. It appears to me to be mechanically and physiologically sound and to have advantages over other methods in common use, and I suggest that it is the operation of choice in a very large number of these fractures.

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DELAYED RECOVERY FROM TRILENE ANÆSTHESIA

S. F. DURRANS, M R C S, D A
ANÆSTHETIST TO THE CORNELIA AND EAST DORSET HOSPITAL AND ANÆSTHETIST TO THE EMS

So much has been written about trichlorethylene 'Trilene') anæsthesia in the past six months, including ome reports on fairly extensive trials, that I have been urprised that "delayed recovery" after its use, which I ave often noticed in my own practice, has not been ecorded. Some delay in recovery is noted after every dministration of this drug, and occasionally it lasts so ong as to cause anxiety.

The rate of recovery from inhalational anæsthesia epends on many factors but other things being equal is inversely proportional to the relative lipoid solubility, and directly proportional to the relative volatility the agent employed. Trilene, with a boiling point 87° C., is the least volatile of the inhalational anæsthecs; and as it has a high degree of lipoid solubility, its imination from the tissues will be slow.

I have used trilene chiefly with nitrous oxide anæsthesia receded by 'Omnopon Scopolamine' and 'Pentothal') r operations requiring little relaxation, such as nsillectomies in adults, orthopædic operations and ajor dental operations. I have found it useful to press the laryngeal reflex just before intubation in tients who have had pentothal or 'Avertin' and in om it is proposed to maintain anæsthesia with nitrous ide and oxygen; in such cases the coughing which llows intubation—and which so often expels the ertin—is avoided. In some cases I have used it cause of its high analgesic quality, and at other times cause it is non-flammable and non-explosive. Thus is acceptable for circumcision or other minor erations on infants, and in the treatment of nævi by athermy.

In most of these cases trilene has played a subsidiary e, or anæsthesia has been light and short, so that the tients' tissues have not been saturated with the drug. Nothing untoward has happened except occasional diminished respiratory excursion and tachypnœa; the recovery-rate has been normal and the anæsthesia satisfactory. In cases where trilene has played a greater part in the anæsthesia and the patient has been more deeply saturated, for example in adult tonsillectomies, there has been a prolonged period of recovery as compared with that following other agents, though this has not been serious enough to cause anxiety.

sed trilene as the
the patients un-
anæsthesia was light
period
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The first was an elderly man undergoing laryngofissure; the operation took just over 2 hours; premedication was by omnopon gr. 1/3, atropine gr. 1/100, induction by pentothal 0·25 g., maintenance by trilene and oxygen through a tracheotomy. This patient slept for 14 hours after the operation, was not sufficiently awake to take fluids by mouth for over 36 hours, nor fully recovered for another 12 hours. Vomiting was slight and fortunately there were no chest complications; at no time did the blood-pressure, pulse or respiration-rates cause anxiety. But such a long period of recovery is not desired after an operation upon the respiratory passages.

The second patient was a young and robust girl undergoing removal of an impacted wisdom tooth. Again the operation took two hours. Premedication was by omnopon gr. 1/3, atropine gr. 1/100 and induction by pentothal 0·5 g. The intended anæsthetic was nitrous oxide and oxygen preceded by a little trilene to facilitate "blind" intubation and to prevent coughing; unfortunately my nitrous oxide expired after the first hour and my spare cylinder proved to be empty. I was therefore constrained to continue the anæsthesia with trilene and oxygen for the remaining hour, and though anæsthesia was in so light a plane that lacrimation was constant, the patient became saturated with trilene. She was unconscious for 15 hours after the operation, unable to take fluids by mouth up to 36 hours after, and not completely recovered for a further 24 hours. As in the first case the blood-pressure, pulse or respiration-rates were not abnormal, but again the long period of recovery was a source of anxiety. This, like the previous case, showed that it is not desirable to let the patient become saturated with trilene.

In a third case a similar delay in recovery followed a short operation; the anæsthesia was deeper than in the other two but the operation lasted such a short time that it did not seem possible that the patient could have become saturated with the drug. She was a fat young woman undergoing interval appendicectomy. Premedication was by omnopon gr. 1/3, scopolamine gr. 1/150, given 1½ hours before operation; induction by penthothal 0·4 g., maintenance by intratracheal nitrous oxide, oxygen 20% and trilene. My choice of trilene in this case was purely experimental and I warned the house-surgeon to expect some delay in recovery. My warning was justified, for this patient, like the other two, took 36 hours to recover from the anæsthetic. In other respects anæsthesia was satisfactory, relaxation was good and there were no sequelæ.

In view of these experiences it seems that the uses of
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operations where first plane anæsthesia suffices. The
upon any part of the respiratory tract.

QUEEN ELIZABETH HOSPITAL, GATESHEAD.—The King has commanded that the new general hospital under construction by the county borough council of Gateshead shall be known as the Queen Elizabeth Hospital. It is expected that the maternity unit of the hospital will be opened within the next two months and the general ward accommodation about the end of the year. In all some 200 beds will be provided.

CLINICAL SIGNS OF DIPHTHERIA IN INOCULATED CHILDREN

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RMO AT THE CITY HOSPITAL FOR INFECTIOUS DISEASES, WALKERGATE, NEWCASTLE-ON-TYNE

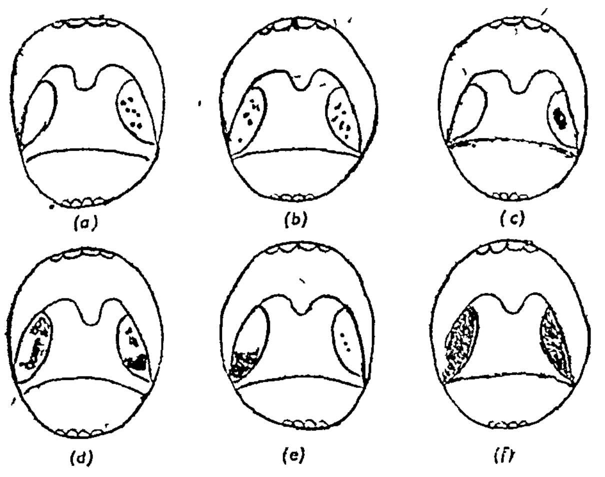
MOST children who have been inoculated against diphtheria do not contract the disease at all, but a few do. In these inoculated subjects diphtheria becomes a different disease, less severe but much more difficult to diagnose. I propose to give an account of 50 cases of diphtheria in inoculated persons observed from the onset of the disease to convalescence.

Of recent years several papers have been published giving the results achieved by inoculation against diphtheria and explaining the causes of failure to produce adequate immunity. The causes can be divided into extrinsic and intrinsic factors.

The extrinsic factors are mainly technical faults—e.g., incomplete inoculation by the injection of only one dose; insufficient dosage; failure to ensure uniformity of the preparation by shaking before use; or too short an interval between the injections.

There are three intrinsic factors: (*a*) inoculation of infants is ineffective at an age when the biochemical reaction, on which the production of antibodies depends, is poorly developed; (*b*) 3–4% of the children receiving inoculation do not respond to the inoculation and remain Schick-positive; and (*c*) the immunity is temporary. It has been observed that 22–34% of immunised children become Schick-positive after 4–7 years when they are living in a neighbourhood with low diphtheria incidence; in densely populated cities, however, where diphtheria is endemic, immunity may last much longer. Dudley and his colleagues (1934) recorded, in London, a Schick-relapse rate of 12% after 5 years; other recorded rates are: in America, 17·9% after 10 years (Young and Cummings 1932) and 22% after 6–7 years (Schwartz and Janney 1938); in Canada, 34% after 5 years (Fraser and Brandon 1936); in Iceland 26% after 4 years (Sigurjónsson 1939); and in England, 2% after 1 year (Fulton et al. 1942).

The clinical diagnosis of diphtheria is based mainly on the following signs: the presence of membrane; involvement of lymph-glands; œdema of the tonsils and the uvula; oral fœtor; and nasal discharge. The most striking difference between typical diphtheria and diphtheria in inoculated persons lies in the appearance of the membrane. The extent of the membrane in the throat varies. In common diphtheria it may consist of one or more patches on one or both tonsils, which tend to spread quickly and to cover more or less the whole of both tonsils and to involve later the anterior and posterior faucial pillars, the soft palate and uvula within 12–48 hours. Appearances suggestive of follicular tonsillitis are comparatively uncommon at the time of admission to [illegible] In inoculated children, on the other hand, the [illegible] resembles follicular tonsillitis is very common.



(*a*) One tonsil covered with minute spots
(*b*) Both tonsils dotted with deposit resembling follicular tonsillitis.
(*c*) A single patch on one tonsil. (*d*) Several patches on each tonsil.
(*e*) A patch occupying part of one tonsil; the other tonsil covered with minute spots. (*f*) Whole surface of both tonsils covered with deposit.

In the present series there were 3 cases in which only one tonsil was so affected (fig. *a*) and 9 cases in which both tonsils were dotted with minute deposits in the crypts, resembling a follicular tonsillitis (fig. *b*). In 7 cases the membrane presented itself as a single small patch on one tonsil (fig. *c*), and in 11 cases on both tonsils (fig. *d*). In 9 more cases a small patch occupied part of one tonsil whereas the other tonsil was covered with minute spots (fig. *e*). In only 10 cases of the series was the whole surface of both tonsils covered with deposits (fig. *f*). In contrast with ordinary diphtheria, the deposits, which do not usually coalesce in inoculated cases, spread slowly and rarely involve the anterior faucial pillars or soft palate. In ordinary diphtheria the membrane as a rule is at first firmly adherent to the subjacent mucous membrane, and if an attempt is made to scrape it off, there is bleeding. In inoculated cases however the membrane can be easily wiped off, even in the earliest stages of the disease, leaving a pale greyish area of mucous membrane which does not bleed. In only a quarter of the present series was the membrane firmly adherent.

There is usually a characteristic and unpleasant fœtor from a diphtheritic throat. It was found in 19 cases of the series. Some degree of adenitis is common in diphtheria (the severer the case the more intense the adenitis), and this was present in 23 cases; 2 cases of very severe lymphadenitis and periadenitis were encountered and [illegible] case of "bull-neck." The temperature reached the high levels of 102–103° F. in 17 cases; in 13 cases it was le than 100° F., and 21 patients of the series had no rise [illegible] temperature at all. Œdema of the soft palate. the faucial pillars, or the uvula was seen in 4 cases. Muco-purulent nasal discharge associated with nasal obstruction is often observed in diphtheria; 7 cases have had [illegible] nasal discharge in the present series.

It stands to reason that even in severe diphtheria one or more of the criteria mentioned above may be absent but consideration must be given to all of them in diagnosing a case of diphtheria in an inoculated patient.

Complications.—Heart complications are the mo dreaded, and are responsible for the greatest number [illegible] deaths in diphtheria. In the series of 50 cases I found 6 cases of cardiac disorder. In each case myocarditis wa present but in none was a lesion of the conducting system demonstrated by an electrocardiogram. All of the recovered within 2–6 weeks.

Paralysis of the soft palate, common in ordina diphtheria, was found in 2 cases. Peripheral neuri of the legs, characterised by complete absence of th knee-jerks, occurred in 4. Neither pharyngeal n respiratory paralysis was observed.

DISCUSSION

The children had been inoculated [illegible] TAF. The inoculation was complete in all [illegible] where a one-shot method was used. The interval be tween the inoculation and the onset of the disease vari between 3 months and 6⅔ years. One case showed th sufficient immunity is not achieved when the seco injection of APT has just been given. The time whi elapses before the child is protected is at least 6 we after the second injection of APT. Thus a child sho be inoculated at latest during the summer months if to be protected by autumn, when the morbidity diphtheria is higher.

The predominance of gravis infections is evident in present series; 78% of the cases were caused by diphtheria gravis strain, 18% by intermedius and 2% mitis. The virulence test was found to be positive in instances.

The throat lesion often resembles a follicular tonsilli Hence it may be asked whether these cases have be looked upon as tonsillitis diphtheria-carriers. difference between a tonsillitis in a diphtheria-ca and a diphtheria in an inoculated person is on clin grounds as follows:

The onset in tonsillitis is usually sudden, the tempera high, *the child flushed and complaining of a sore* throat diphtheria the onset is often insidious, the temperature often normal or moderately increased, the child often doe complain of a sore throat.

The deposit in tonsillitis is patchy and is not usually fluent, the deposit in diphtheria in inoculated persons spreads, though not rapidly, within 48 hours.

Tonsillitis may lead to endocarditis. Diphtheria may lead to paralysis, peripheral neuritis and myocarditis, but very rarely to endocarditis.

The percentage of carriers (Topley and Wilson 1941, Dudley et al 1934) is about the same in inoculated and non-inoculated persons and amounts to about 6%; but it has been reported from several sources that virulent diphtheria organisms are more often found in inoculated than in non-inoculated carriers. The percentage of contact carriers in Newcastle was as follows:

	Contacts	Positive on culture %
1938	3541	7·51
1939	3573	5·45
1940	1736	6·5
1941	3101	6·6
1942	3903	6·3

Unless we regard only complicated cases as true diphtheria in inoculated subjects, it is obvious by analogy with ordinary diphtheria that uncomplicated cases must occur.

The danger of diphtheria in inoculated children is twofold:

1. The throat lesion may clear up perhaps without any treatment, but a complication may follow, the most serious

may not be enlarged and the heart sounds are often normal, but the blood-pressure is often lowered. Only by means of an electrocardiogram can the diagnosis be confirmed. The dangers of an untreated myocarditis are obvious.

2. From the epidemiological point of view, the disease may be conveyed to other members of the family or to schoolfellows.

It is a remarkable fact that not one fatal case occurred among the children who were inoculated in Newcastle and subsequently contracted diphtheria; but the risk of death in inoculated cases is not entirely eliminated as has been shown by reports from other sources (Glover and Wright 1942).

Treatment.—In our experience a comparatively small amount of serum is sufficient for treatment. Scarcely more than 10,000–20,000 units of antitoxin have been used. The reason is that an inoculated child is capable of much more rapid antibody-production than the non-inoculated subject, when suffering from diphtheria (Glenny and Sudmersen 1921). The tonsils become free from deposit in a few days. In 13 cases of the present series the throat was clean within three days, in 9 cases within two days, in 8 cases within four days. In 3 cases the deposit disappeared in one day, in 3 other cases it did not disappear before the seventh day

he had diphtheria. He has been immunised." It should be borne in mind that a throat lesion in a child, though inoculated against diphtheria, might be a diphtheria and one should not be readily satisfied with the diagnosis of an ordinary tonsillitis. It would be wrong to wait until the throat lesion of an inoculated child looked "suspicious": often the lesion never looks "suspicious" at all, as some of the accompanying drawings show. To be on the safe side, a small amount of serum can always be given after a Schick test has been done. In general practice a Schick test can hardly be done as a routine on every inoculated child who develops a sore throat, but there will always be an element of doubt in the diagnosis of an uncomplicated case, if the Schick test be omitted. A diagnosis of diphtheria in an

and were

CLINICAL FINDINGS IN 50 CASES OF DIPHTHERIA IN IMMUNISED PATIENTS

No.	Age (yr.)	Immunised with*—	Diph. after (yr.)	Diph. strain	Throat-lesion†	Fœtor	Glands	Œdema	Nasal discharge	Complication
1	6	TAF	4 9/12	I	o	–	–	–	–	..
2	6	APT	5/12	G	d	–	–	–	+	..
3	10	APT	1 3/12	I	f	+	+	+	+	Palatal and ciliary paralysis, periph. neurit., myocard.
4	9	APT	4	I	f	–	+	–	–	..
5	18	TAF	3/12	G	d	–	+	+	–	..
6	5	TAF	4/12	M	b	–	–	–	–	..
7	16	APT	4	G	d	–	+	–	–	..
8	13	APT	6/52	I	o	+	+	–	–	.
9	21	TAF	1 6/12	G	o	–	+	–	–	.
10	7	TAF	.	G	f	+	–	–	–	.
11	5	APT	3 6/12	G	f	–	+	–	–	Myocarditis
12	9	APT	9/12	G	o	–	–	–	+	.
13	11	TAF	2	G	o	+	–	–	–	
14	7	APT	5/12	G	a	–	–	–	–	
15	4	TAF	9/12	I	b	–	+	–	–	Myocarditis
16	4	TAF	2 4/12	G	d	+	–	–	–	.
17	6	TAF	3 3/12	G	o	+	+	–	–	..
18	4	TAF	2 5/12	G	f	+	–	+	–	Myocarditis
19	10	TAF	3	G	b	–	–	–	–	..
20	4	TAF	1 6/12	G	o	+	–	–	+	.
21	14	APT	7/12	G	b	–	+	–	–	..
22	5	TAF	2	G	b	–	+	–	+	..
23		APT	1	G	o	–	–	–	–	..
24	13	APT	7/12	G	c	–	+	–	–	..
25	8	TAF	6 8/12	G	d	+	–	–	–	..
26	5	APT	[illegible]	I	b	–	–	–	–	.
27	8	APT	1	G	d	–	+	–	–	Periph. neurit.
28	8	APT	1	G	o	–	+	–	–	..
29	9	TAF	6/12	G	b	–	–	–	–	..
30		APT	5	G	o	+	+	–	–	..
31	9	APT	6/52	G	d	–	+	–	–	..
32	13	TAF	6/12	G	a	–	+	–	+	..
33	10	APT	8/12	I	a	–	–	–	–	..
34	11	APT	1 2/12	I	b	–	–	–	–	.
35	11	APT	1	G	N	–	–	–	–	..
36	5	TAF	4	I	o	–	+	–	–	
37	12	APT	1 3/12	G	d	+	+	–	–	Periph. neurit.
38	10	TAF	5	G	d	+	–	–	–	.
39	5	TAF	1 2/12	G	d	+	+	–	–	..
40	8	APT	1	G	o	–	–	–	–	
41	7	APT	10/12	G	f	+	+	–	+	Myocarditis
42	10	APT	11/12	G	f	+	–	–	–	..
43	9	APT	1 4/12	G	f	–	+	+	–	Myocarditis; palat. paral.
44	4	TAF	3	G	f	–	–	–	–	..
45	9	APT	10/12	G	d	–	+	–	–	.
46	15	TAF	3	G	c	+	+	–	–	..
47	4	APT	1	G	o	–	–	–	–	Periph. neurit.
48	5	APT	1/52	G	b	+	–	–	–	..
49	6	TAF	4 2/12	I	f	+	–	–	–	..
50	9	APT	1	G	o	+	+	–	–	..

Notes at foot of previous column

inoculated person is based on clinical signs, bacteriological findings and state of immunity.

I wish to thank Dr. J. A. Charles, MOH of Newcastle-on-Tyne, for permission to use the clinical material in the hospital and for permitting me to publish this paper; and Dr. R. Norton for the bacteriological data.

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PALESTINE

HEALTH INSURANCE

THE Palestine workers sick-fund—Kupat Holim—has reached its 30th anniversary. Founded by a group of agricultural labourers in Judæa it has become a country-wide institution, with 210,000 members and dependants, covering 41% of the whole Jewish population of Palestine, with an annual budget of £600,000. Of this total the government pays £600 for school hygiene and infant-welfare work. In other countries the government would probably provide 20% of the budget, instead of this 0·1%. The sick-fund has therefore to demand heavy contributions from its members, from 130 to 650 mils (about 2*s.* 6*d.* to 13*s.* 6*d.*) a month according to the wages earned. Even this scale does not balance the budget, and extra charges have to be made for convalescence, dental benefits and the like. The fund has over 500 beds in its own institutions, to supplement the services provided by the great Hadassah Hospital and municipal hospitals, and maintains a high standard in all its services. Besides modern hospitals it supports a number of convalescent homes and clinics in the towns and villages. By centralising medical supplies it can provide for all essential medical needs, even in war-time at a cost which compares favourably with that of other institutions, including government ones. It provides maternity benefit, maintains antenatal, infant and child-welfare clinics, and supervises the housing of children in rural settlements. The fund's activities might well be studied by those planning a comprehensive medical service elsewhere.

AN AMERICAN HOSPITAL

The best American hospital in the Middle East has arrived in Palestine from Eritrea. It is staffed by 24 specialists in various branches, 3 dentists and a full complement of nurses, and with its 1000 beds will probably be the biggest hospital in Palestine. Built around the contour of a hill, the 34 ward buildings adjoin the administrative, surgical, laryngological, psychotherapy and X-ray departments and the laboratory. The hospital will have its own water-supply and laundry.

INFANT WELFARE IN SOUTH PALESTINE

Under the supervision of Dr. D. Murray, senior medical officer of the south district in Jaffa, five new infant-welfare centres have lately been opened. Most of them have a resident nurse, who advises on general cleanliness. Children attend once a fortnight from the age of one month to two years; those under weight receive supplementary food. The main difficulty is to convince parents, who are mostly simple folk, that the centres are maintained for their benefit, but once convinced they attend regularly. It is hoped that the centres will reduce child mortality, which has in the past been extremely high in this region.

Charterhouse Rheumatism Clinic has set out the main known facts about vitamins and near-vitamins on a card folder. This gives the international units, daily requirement (D is on the low side), toxic dose, function, normal blood level and tests for deficiency. In the next edition K will no doubt be promoted, having a real and known function in human nutrition. The card will be sent free on application to ymouth Street, W.1.

Reviews of Books

War and Disease

RALPH H. MAJOR, MD. (Hutchinson. Pp. 190. 12*s.* 6*d*)

Professor Major has an easy style suited to his romantic conception of history. Disinclined to tax the reader with dry analyses of social, economic and political forces, he paints a Delacroix picture, in which "the Corsican Colossus," "the Lady with the Lamp," Dunant, Larrey, Gorgas and other persons of importance look out of the frame colourfully enough to keep the story arresting. The chapters would make a good set of talks to a general audience, but as reliable medical or military history they are too anecdotal and sweeping. In the chapter entitled "After Versailles" the author carries his account up to 1941. Seeing us across the Atlantic he has been misled by some of the contemporary documents into stating that "it was generally agreed that most Londoners were in frequent, many in constant, need of some drug to carry them off to temporary oblivion, while a hell of noise, crash, and screaming sirens raged," and that "British physicians describe a 'new' disease, 'shelter fever,' apparently the same as the trench fever that was so prevalent during the World War. The conditions of life in the air-raid shelters resemble closely those in the trenches, where trench fever was transmitted by the louse." Similarly, Culpin's strictures in 1940 on "diagnostic and therapeutic inertia" in regard to neuroses have been taken too literally.

Microbiology and Man

JORGEN BIRKELAND, PH D, assistant professor of bacteriology, Ohio State University. (Baillière. Pp. 478. 22*s.*)

THIS book describes the part played by bacteria in everyday life. The material is arranged in the conventional manner; general properties of organisms are followed by sections on infection and resistance, on the common infectious diseases and on the bacteriology of food, milk, water, sewage and soil. Emphasis is placed on methods for obtaining information and on the inferences that can properly be drawn from observations. The importance of epidemiology is stressed and it is good to find elementary students taught about John Snow and William Budd. The book is thoroughly up to date and contains descriptions of the electron microscope, of the newer antibiotic substances and a picture of a sneeze. Methods advocated for the control of infection are sound and there are many valuable figures and charts. Some subjects receive too little space, but if too little is said about the salmonellas we are told about the bacteriology of swimming pools, about the pasteurisation of beer and the detection of adulterated strawberry jam by planting the seeds for timothy.

Infant Feeding in General Practice

(2nd ed.) J. VERNON BRAITHWAITE, MD, FRCP. (Wright. Pp. 165. 7*s.* 6*d.*)

The *Times*, advocating the encouragement of breast-feeding, lately quoted an opinion that doctors are the greatest enemies of natural feeding in that the commonest stated cause for weaning to the bottle is medical advice. Doctors may reasonably hold that responsibility for the prevailing easy resort to bottle-feeding rests on many shoulders besides their own, but in so far as the reproach is justified Dr. Braithwaite's book, if widely read by those to whom he addresses it, should do much to remove it. Breast-feeding and its difficulties, bottle-feeding, nutritional disorders and allied conditions are dealt with in succession. Dr. Braithwaite writes vigorously, basing his advice on experience and common sense, and illustrating it with well-chosen cases. The successful management of breast-feeding and the diagnosis and treatment of the dyspepsias of infancy, in practice so perplexing and depressing, are perhaps made to appear a little easier than the practitioner may find them but the lines on which they should be tackled are clearly laid down and the accepted classification of the dyspepsias by Czerny and Finkelstein is well summarised and expounded. To read the book through and to have it on his shelf should really help the doctor who wishes to accept his due responsibility for the babies in his practice.

THE LANCET

LONDON: SATURDAY, AUGUST 14, 1943

BABEL IN THE DRUG TRADE

IT is questionable whether the British drug trade, in its present form, makes the most of its great opportunities for public service. The war has revealed unexpected deficiencies. Though the British Empire is capable of supplying every animal, vegetable and mineral substance required in the manufacture of drugs, we were in 1939 largely dependent on outside sources for essential remedies such as digitalis, atropine, hyoscine, ergot, quinine and agar; and we were unable to manufacture all the sulphonamides, the barbiturates or the synthetic vitamins we needed without importing intermediates from other countries. Our dependent peoples and their cattle and crops were starved of essential drugs and parasiticides. True, the drug industry, like the rest of the country, was not prepared—was not organised—for war. But is it prepared for peace? Many people had hoped that the industry would have developed along more progressive lines as a result of the war, but it seems to have been exhausted by the effort of producing the Therapeutic Research Corporation, not yet a flourishing offspring. Particularly disappointing is the attitude of parts of the trade towards the canons of ethical nomenclature.

The Pharmacy and Medicines Act [1] of 1941 demands that if a substance, not being a poison included in the Poisons List, is described in the British Pharmacopœia or the British Pharmaceutical Codex, the description set out at the head of the monograph shall appear on the label. In other cases the accepted scientific name

nature of the

must appear.

Unfortunately however there is nothing to prevent the manufacturer from putting an additional name on the label; there is no control over the size of type used for the various names on the label or in advertisements, and it is open to manufacturers to put the maximum stress on the brand name and the minimum on the official designation. The Council on Pharmacy and Chemistry of the American Medical Association very rightly refuses to recognise proprietary names for articles which are included in their pharmacopœia or national formulary. In the marketing of original articles," they say [2] "the legitimate interests of the

d by identifying such products

or initials of the manufacturer

or by the use of a general brand mark." The same must be true over here, yet a barbiturate which has been in the British Pharmacopœia for eleven years has recently been issued under a proprietary designation. The whole of the work on the anticoagulant drug 3 : 3-methylene-bis-(4-hydroxycoumarin) was done in America; neither British medicine nor the British drug firms have made the smallest contribution to knowledge in this field, and the synthesis of the drug is now child's play; the Americans have adopted "dicoumarol" as its short name: nevertheless a number of British manufacturers have issued it under their own proprietary designations. And distributors as well as actual producers join in the game—so successfully that we were able on June 26 (p. 821) to list 54 trade names for sulphanilamide, most of them admittedly continental.

The British Pharmacopœia Commission, through its nomenclature committee, has tried to improve matters by providing an approved name for drugs at an early stage of their introduction to the medical profession. Through this committee the commission is in touch with trade organisations, the manufacturers themselves, and the Comptroller of Patents and Trade Marks. The Comptroller, when granting licences to use enemy patents, can require that any substance made under the licence shall be marketed under one uniform non-protected name, but it is doubtful whether he has felt justified in making it a condition that the unprotected name shall be the only one. Some manufacturers now use the approved name with a suffix, but other members of the trade have not cooperated so well. Thus the German drug 'Cardiazol' was officially designated leptazol, but British preparations of it are still being sold under half a dozen names. It cannot be pretended that leptazol is an important enough drug to justify all this diffusion of effort. The very alphabet can no longer cope with this multiplication; it is now hard to find a name for a genuine new drug which has not already been registered as a synonym for an old one. The strongest individualist would probably agree with the Socialist Medical Association [3] that preparations should be standardised as regards name, package and price, and that firms should concentrate on particular products, thereby eliminating wasteful competition. It is difficult to frame legislation about nomenclature which cannot be circumvented, but the present tactics look unsound from the narrowest viewpoint of self-interest. The British drug industry has not always been able in the past to meet the competition of Germany and the USA, and it seems unwise to divide its forces by internecine competition. This, however, is not the doctor's concern; all he asks is that his task shall not be made more difficult by a confusion of names, and that some authoritative body shall be given powers to bring and keep order in this chaos not as a war-time measure but for good.

DELIVERANCE FROM DIPHTHERIA

A CHILD'S liability to contract diphtheria can be measured. His resistance to infection can be greatly increased by immunisation. Those who develop the disease can almost always be saved by giving antitoxin on the first day. Yet in this country diphtheria is still the principal cause of death in children aged 5–10 and the third commonest cause at ages 1–5 and 10–15.

RUSSELL'S report [4] published by the Medical Research Council provides ample evidence of the value of active immunisation, and shows the wisdom and importance of the present efforts of the Ministry of Health to popularise it.[5] In assessing the effect of immunisation it has to be remembered that little change in the incidence of the disease in any particular area can be expected until a substantial proportion of the children have been protected—preferably in all age-groups. In the United States the authorities concentrated at first on immunising the school population, but it was GODFREY, director of the New York State department of health, who expressed the opinion that active immunisation of 50% or more of the age-group 5–14 had no definite effect on diphtheria incidence in the community; whereas when the immunisation of 30% or more of the children under 5 was added there was an immediate decline in the disease. In only a few cities—notably New York and Toronto—are the numbers immunised large enough to afford statistical confirmation of the efficacy of preventive inoculation. In both these places there was a downward trend in the mortality before active immunisation started. Thus in New York the death-rate from diphtheria, which was 785 per 100,000 in 1894, fell to less than 300 in 1900 and to below 100 in 1920. In that year the immunisation of school-children began, and by 1928 50% of the school population was "protected." The authorities then concentrated on pre-school children, and in 1940 about 60% of these had been immunised. The result, as RUSSELL shows, is that diphtheria has been virtually eliminated as a cause of death, the mortality now being 1·1 per 100,000. A similar story can be told about the morbidity. In both New York and Toronto, it was falling before immunisation began; but the difference between the actual and expected case-rate in the post-immunisation period is significant and this difference is increasing with time. To those who attribute the accelerated rate of decline to hygienic improvements, it can be said that the effects of such improvements will show themselves equally in cities where immunisation is neglected.

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[1] Chapman, H. E. The Law Relating to Medicines, Bedford. 1942.

[2] New and Non-Official Remedies, 1941.

3. 3.

4. ast Forty Years. By ed. Res. Coun., Lond.

5. ils of publicity cam- Health, the Ministry of Health Education.

But in such places diphtheria has not decreased to anything like the same extent. It is tragic that progress in immunisation against diphtheria in Britain has been so slow, and the general practitioner in particular has a large part to play in the present national campaign by his attitude and advice as well as by active participation. The children whom it is most important to protect are those between 1 and 5 years old. Experience has shown that parents may be reluctant to submit their youngest children and they must be made to realise how deadly diphtheria is at this age. The use of alum-precipitated toxoid in two doses at an interval of at least a month, commencing with 0·2 c.cm. and following with 0·5 c.cm., is of proven efficacy, but the APT should be well shaken immediately before use. (It will even settle out in the syringe and falsify results if steps are not taken to prevent this from happening.) A "refresher" dose, after an interval of say five years, is indicated for young children, especially those who were inoculated in infancy and are about to enter school. A single dose of 0·3–0·5 c.cm. suffices for this purpose. There is no danger of anaphylaxis. Though not essential, a Schick test three months after inoculation is completed serves to reveal the few in whom it is necessary to repeat the process to secure the necessary protection. From time to time persons are found who do not become Schick-negative until they have had three complete courses of inoculation. Happily they are uncommon; and if a high proportion of children of [illegible] and school age were given two doses of alum-precipitated toxoid, those in [illegible] incomplete would have little [illegible] for the risk of an epidemic would have been removed.

There is another aspect of this protective inoculation which has a bearing on general practice—namely the diagnosis of diphtheria in inoculated persons. Elsewhere in this issue Dr. NEUBAUER gives reasons for the failure invariably to secure protection and it will be evident that practitioners must expect to see now and again a case of diphtheria in an inoculated or allegedly inoculated subject. There has been a tendency to allow procedure to be influenced by the fact of inoculation. In some cases antitoxin has been withheld pending a bacteriological report, in the belief either that the disease cannot be diphtheria because the patient has been inoculated, or that he must be partially protected and there is therefore no urgency. This is a grave mistake. A proportion of those in whom inoculation fails to give protection appear to have a defective response mechanism, and they need all the help they can get in the form of antitoxin. When there is reason to suspect diphtheria in an inoculated person, the action taken should be the same as if he has not been inoculated.

Interesting speculations arise as to what will be necessary to maintain an immune population when inoculation is practised sufficiently to prevent epidemic diphtheria and greatly to reduce its endemic prevalence. Bacteriologists recognise three ways in which individual immunity to the disease may be secured. The immunity may be: (1) natural or inborn; (2) acquired by clinical or subclinical attack or by exposure to repeated small doses of diphtheria organisms which do not give rise to any manifest infection; or (3) artificially produced by the injection of immunising agents. The joint contribution of (1) and (2) to the "protected" population can be ascertained by Schick-testing the children, and a sample inquiry of this description, made in Baltimore and described by FROST, is mentioned by RUSSELL. At the age of 5, some 21% were Schick-negative (i.e. immune), but by the age of 15 the proportion had risen to 68%, although only 12% were known to have suffered from clinical diphtheria. FROST's figures show that the children had been immunised naturally at an average rate of 4·3% per annum in the first 5 years of life, 6·1% per annum between 5 and 10, 3·2% per annum between 10 and 15. He contrasted these figures with the clinical-diphtheria rates at the same ages and concluded that "with increasing age, children suffering infection with the diphtheria bacillus are progressively likely to develop immunity rather than the disease." It is known that a population in an environment which lends itself to the acquisition of immunity naturally in this way more readily protected by inoculation; the basal immunity established by infection is stimulated to a high level of active immunity by subsequent inoculation. The question arises, what inoculation procedure should be adopted when the opportunity for acquiring immunity in the natural way is diminished? It may be found necessary to revert to three doses in place two, the first establishing basal immunity and the other two stimulating a high response. There are some engaged in diphtheria inoculation work now who are not satisfied that two doses of an antigen are as good as three.

ANTI-THYROID SUBSTANCES

SEVERAL different researches have lately focused attention on substances which impair the functional activity of the thyroid gland or inhibit the action of its secretions. For many years it has been known that the condition of the thyroid in animals can be modified by the addition of certain greenstuffs to the diet. Thus the leaves of cabbage and other brassicæ have a goitrogenic effect in rabbits[1 2] and the same effect can be produced in rats by feeding brassica seeds[3 4] and soya bean.[5] The changes in the thyroid have been described as diffuse parenchymatous goitre[6] involving increase in size with hyperplasia and loss of colloid. Remarkable changes in thyroid weight over long periods, from an average of 0·18 g. to one of 19·5 g., are recorded in rabbits.[1] The earlier accounts differed as to whether these changes could be inhibited by administration of iodine, as to the resulting metabolic state, and as to the nature of the inciting mechanism. It may be noted, however, that simultaneous changes have been recorded in the anterior pituitary gland[7] and that the thyroid changes do not take place in the absence of the pituitary gland.[8] It is likely, therefore, that the changes in the thyroid are secondary to disturbance of the pituitary thyrotrophic function.

Attempts to isolate the causative substance present in rape seed[9] suggested that it might be a derivative of thiourea, and it was found that allyl-thiourea in a daily dose of 20 mg. caused the typical size and histological changes in the rat thyroid, as well as the associated and probably primary changes in the pituitary. This observation was slightly anticipated by the reports that thyroid hyperplasia could be induced in rats by thiourea[10] and sulphaguanidine.[11] A more recent investigation has shown that the effect can be produced by sulphonamides and thioureas in rats, mice and dogs, but not in chicks or guineapigs.[12] An addition of 3% of sulphaguanidine to the diet of immature rats increased the size of the thyroid by [illegible] times more effective than sulphaguanidine. Diethyl-thiourea and allyl-thiourea were also active; acetyl-thiourea and thioacetamide were inactive under the same conditions. An addition of 20% of sulphaguanidine in the diet lowered the basal metabolic rate (BMR) of rats to − 20 at 10–14 days. The metabolic effect was not prevented by iodine, but could be entirely prevented by thyroxine. The thyroid changes were prevented by hypophysectomy. In a coincident report[13] very similar results are described, the "goitrogenic" activity of a number of compounds decreasing in the order thiourea, sulphadiazine, sulphapyridine, sulphathiazole, sulphaguanidine, sulphanilylurea, sulphanilamide, and sulphasuxidine. The changes in the thyroid are attributed to failure in synthesis of thyroid hormone, and both reports emphasise that the metabolic changes are those characteristic of hypothyroidism, despite the apparently hyperplastic state of the thyroid. It is curious that a thyroid condition mediated by pituitary derangement and leading to hypothyroidism should be so different from that produced by pituitary excision. Clinical use of these substances in cases of hyperthyroidism was soon attempted, and it is reported[14] that daily administration of 1–2 g. of thiourea, or 0·2–1·0 g. thiouracil to hyperthyroidic patients brought relief of the symptoms after a latent period of a week or two. Cessation of treatment led to a return of the hyperthyroidic condition, while overdosage resulted in the appearance of the early signs of myxœdema after about 5 weeks. It is not yet evident to what extent there may be danger of hypothyroidism following the prolonged use of sulphanilamide and related substances, but evidently this contingency must not be overlooked.

The substances discussed above are not known to occur naturally in the body and there is as yet no suggestion that anti-thyroid action of the type described plays any part in the normal regulation of the gland. On the other hand, there is news that a naturally occurring substance, paraxanthine, is capable of inhibiting the effect of thyroxine on the frog's heart, and the two substances can be titrated accurately against each other[15]; 0·22 µg. of either natural or synthetic paraxanthine inhibits the effect of 1 mg. thyroxine. Similarly, an optimal dose (20–25 µg. per day) of paraxanthine by mouth lowers the BMR of the intact rat. The concentration of paraxanthine in ox blood is 0·2–0·6 µg. per c.cm.; so, assuming a similar concentration, the total amount present in the blood of a rat would be 5–15 µg., which is within the range of amounts which cause pronounced changes in BMR. The authors of this report conclude that the metabolic state of an animal is controlled not merely by the amount of thyroid secretion but by the balance between the secretion and the endogenous paraxanthine.

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MORE HEALTH LEAFLETS.—The Central Council for Health Education maintains its output of pleasantly coloured and cleverly written leaflets on aspects of health and preventive medicine. Three of the latest (The war on disease, Right dress for health, Just nerves) contain, in little space and easy language, a remarkably solid dose of public-health teaching. *Just Nerves* is specially good, designed to give the anxious just that bit of insight which will lift them out of misery into patience or even move them to make an active effort towards recovery. *Measles is a dangerous disease* is another good one, setting out on the back the early symptoms and inside reminding the mother that measles begins like a cold, and is most infectious before the rash appears. *The Pasteurisation of Milk* is evidently intended for a different public. It is written by Dr. G. S. Wilson and sets out the facts about pasteurisation neatly and scientifically but not in the simple terminology of the other leaflets.

Annotations

IMPRESSIONS OF RUSSIAN SURGERY

THE British surgical mission to Russia, which included Surgeon Rear-Admiral Gordon-Taylor, Mr. Rock Carling, Major-General D. C. Monro and Mr. R. W. Watson-Jones, has returned, after inspecting hospital arrangements as far forward as Vyazma and studying the work at sorting, field and mobile hospitals as well as medical institutes in Moscow. Their general conclusion was that the Russians have nothing fundamental to learn from us, nor we from them—we all observe the same principles and differ only in the details of their application. Nevertheless, their young surgeons would certainly benefit from a spell in some of our best hospitals and ours would find the practice of Russian clinics highly stimulating. The mission were struck by the vast scale on which surgery is done in the USSR. For example, it was a surprise to find Professor Yudin doing three operations in one day for the replacement of permanently obstructed œsophagus by jejunum; these were his 89th, 90th, and 91st such operations, and he spoke of a colleague who had done even more. The anæsthetic was spinal, with some infiltration of the mesenteric roots, and was entirely effective. The rapidity of Yudin's work was notable and the bowel was carried up to the level of the hyoid with apparent ease. In an emaciated woman this was a formidable operation, but a week later she was in good condition. Yudin numbers his gastrectomies by the thousand, with large numbers of them total—he is, in fact, something of a prodigy among abdominal surgeons. In war-time he has turned his attention to compound fractures. His views on excision of the wound differ from ours in this respect: he is not content to limit his intervention to cases reaching operation within 6–12 hours. Whenever his cases reach the place where operation can be carried out in satisfactory circumstances—be it 6, 8, or 10 days after wounding and whatever the state as to infection—he excises all necrotic tissue, makes a very large hole into the limb, and keeps it wide open by suturing the skin to the deep fascia not only in the primary wound but in any counter-opening that may be needed to secure free drainage. To the questions whether this procedure would not open up every possible fresh plane for the spread of infection, and how one can be sure of avoiding nerves and arteries in the swollen tissues, Yudin could reply that he has followed this course in many hundred cases without encountering such disasters. On the question of the skin-tight plaster, which was described in detail by Pirogoff in 1856, Yudin and other Russian surgeons are less definite. They believe in immobilisation as complete as possible, and employ a skin-tight plaster whenever they feel it is safe, but they prefer to watch a case for 3 days before they apply the plaster. They like plaster for transport, especially for long journeys, but except in the most straightforward wound they have misgivings as to the omission of padding unless the plaster can be watched continuously. The Soviet Army medical organisation is designed to segregate all types of case from the outset, at sorting hospitals five miles behind the firing-line. When this can be done (and it is not always practicable in warfare of a different kind from theirs) it ensures that all the specialists—for head, chest, jaw, plastic surgery, fractured femur and so on—receive their cases in their special hospitals or clinics after they have been treated from the first by young members of their teams who know just what their seniors like done. Our specialists often complain that their pitches are queered by unthinking early treatment, but that is not a complaint of their Soviet opposite numbers. Is this at least partly why the Russians get 70% of their wounded back to the firing-line? Another factor may be the toughness of the Russian con-

GLOBIN INSULIN

THE attempt to stabilise the diabetic on one dose insulin a day without producing hypoglycæmia on th one hand or undue glycosuria after meals on the other has led to the development of a new type of in 'Globin' insulin (with zinc) by the research la of Burroughs Wellcome & Co. (USA). This is a co tion of insulin with globin, a simple protein c from red blood-cells by removal of the chromogen frac tion. It forms a clear aqueous solution at a pH of 3 and contains a small proportion of zinc chloride. It is claimed that in rapidity of onset and duration of actio it is midway between unmodified (soluble) insulin and protamine zinc insulin (PZI); that in many cases a single injection without the addition of any solubl insulin affords a smooth control of the blood-suga throughout the day; that a smaller dose is needed tha with either soluble or protamine zinc insulin; and that no allergic reactions have been met with. The clinica trials on which these claims are based were made i America. In this country the only observations so fa published are by Lawrence,[1] who found in a strictl controlled case that there was little difference betwe the blood-sugar levels after globin insulin and PZI although globin insulin came into action more quickl The maximum effect of both was 15–18 hours afte injection, making the night the most likely time fo hypoglycæmia. Both the American workers and Law rence compare globin insulin with PZI and also wi unmodified soluble insulin, which is more rapid stronger in hypoglycæmic action, but do not comp with delay or retard insulin, Hagedorn's original prota mine insulin, whose action is midway between that o PZI and soluble insulin. Retard has indeed been larg superseded by PZI, and entails the rather troubleso addition of buffer substance to each bottle, but it shoul not be forgotten. Lawrence[2] in 1939 gave the following table, to which may be added the figures of two America workers and of Lawrence himself for globin insulin.

Type	Doses (units)	Duration of action (hr.)	Commonest time for hypoglycæmia (hr.)
Soluble	Up to 10 10–20 20–40	5–6 6–8 10–12	2–4 3–5 6–8
Retard	Up to 20 20–40 40–60	8–10 12–16 Up to 24	4–6 6–9 7–12
ZPI	Up to 10 10–20 20–30 30–40 +	6–8 Up to 12 18–24 24 +	5 8–12 8–20 16–24
Globin .. .. (Duncan & Barnes)	Not stated	18–24	2–8
Globin .. .. (Levitt & Schaus)	Not stated	18	8
Globin .. .. (Lawrence)	32 (4 days)	24	15–18

So far as can be judged the main advantage of glob insulin is the early onset of hypoglycæmic action within 2 hours of injection (according to Duncan a Barnes).[3] Levitt and Schaus[4] found that considerab smaller doses were needed in both uncomplicated a complicated diabetes than with either soluble insulin PZI. Lawrence gave the same number of units of e of the three insulins, and found that globin insulin no more powerful than PZI. There are two practic disadvantages. The first, pointed out by Lawrence, that globin insulin is a clear solution indistinguishal

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1. Lawrence, R. D. *Brit. med. J.* 1943, ii, 103.
2. *Ibid*, 1939, i, 1077.
3. Duncan, G. G. and Barnes, C. E. *Amer. J. med. Sci.* 1941, 202,
4. Levitt, A. and Schaus, J. P. *Med. Times N.Y.* June, 1942, p.

in appearance from ordinary soluble insulin, and that patients who are accustomed to opaque slow-acting insulins and to a clear, quick, powerful insulin, are likely to make mistakes. A second minor drawback is that [illegible] made only in the concentration of 80 [illegible]., which is inconvenient except for large [illegible] to the c.cm. being the most common [illegible] practice a combination of PZI and soluble insulin is satisfactory in the great majority of cases. Retard insulin fills the gap of intermediate action, and is useful for children whose last meal is about 6 PM and also in certain severe cases where the three types given together before breakfast ensure a steady balance all day. The value of this new preparation has yet to be established and carefully controlled clinical trial will be needed before it is used for ambulant diabetics leading ordinary lives.

SEAMEN AND HARDSHIP

> "It is strange, too, that he most strongly enlisted my feelings in behalf of the life of a seamen, when he depicted [illegible] spair. For [illegible] sympathy. [illegible] and famine; of death or captivity among barbarian hordes; of a lifetime dragged out in sorrow and tears, upon some grey and desolate rock, in an ocean unapproachable and unknown."

Edgar Allan Poe,[1] writing in 1838, did not include he risks of immersion foot, of blast, shrapnel and bullet njuries, of burns and scalds from bursting boilers. He new of sharks, but not of the blue-fish, "an animated hopping machine," nor of the barracuda, which will vulse large pieces of muscle [illegible] ail is torn from the head at [illegible] n a most instructive, fascin[illegible] ittle book[2] Critchley has gathered the experiences of hipwreck survivors, and has described the medical onsequences of the risks they run. To the sheltered andlubber they have an almost fantastic quality, and ne wonders at the courage and hardihood of men, who aving gone through such ordeal once will face it a econd, a third and a fourth time. The psychological onsequences are no less interesting than the purely medical, and offer as many unsolved problems. Anderson[3] has provided a masterly analysis of the mental and motional changes that take place in the survivors afloat, nd has described the mass hallucinations which the mild onfusion of exhaustion and the extreme intimacy of ommunal suffering may produce in the boat's company. It seems that this depth and intensity of [illegible] he is on the rescue ship, and a chance submarine may bring him again to within an ace of the death he has o recently escaped. According to Margolin et al.,[4] often hough the men feel worse ashore than at sea; and they eport one as saying: "I go home. I say I never go o sea again until the war is over. They make big fuss. My mother, she so good to me I can't stand it. In two lays I go back to sea."

From the reports available the problems of neurosis are ot quite the same in the Army as in the Navy. In the Navy there is a higher proportion of states of depression, lower incidence of anxious and hysterical pictures. he differences probably rest on differences of constitutional type in the men attracted to these Services, and n the Navy there are more of the cyclothymic constitution. In the Merchant Navy, the type of man is probably ifferent again, and includes more of the social rebels and he rolling stones which have sought and found an independence and a brotherhood of their own. Margolin and his co-workers note that: "by and large they were small in stature, thin, wiry, gnarled and underfed," and that they were better read than a comparable group of working men, and accustomed to thinking for themselves. Many novelists have commented on the intellectual and often mystical interests of men of the sea. In a psychiatric ward for Merchant Navy men in this country it has been noticed that the esprit de corps was exceptionally strong; and that when it became the right thing to go out and get drunk every night, even the least inclined to do so would feel it necessary to stand by his mates in this assertion of liberty and protest against constituted authority.

To be associated with constitutional differences, racial differences of behaviour have been noticed in the ordeal of shipwreck; but as might be expected these differences are by [illegible] ut. According to Critchl[illegible] remains relatively stolid, [illegible] get into a state of despair, and suffer in consequence, he says, a heavy and an early mortality. Margolin et al., however, found that the negroes and Latin Americans of the stewards' department showed a lower incidence of severe neurotic reactions than Anglo-Saxons, Irish and Scandinavians; they were generally better adapted socially, less given to alcoholism, more often married and settled, and had less often had previous nervous disorder. There may be fallacies in both views. Impressions may have been based on an unfair comparison of the behaviour of trained officers with that of the occupants of the fo'c'sle, who represent quite different selections of men; it may well be that a degree of emotional response which would be classed as neurotic in the Anglo-Saxon is normal for the negro. Nor [illegible] by Anglo-Saxon [illegible] to endure; indee[illegible], as Guttmann an[illegible] eir study of the p[illegible] these views could be reconciled, and that whereas the Anglo-Saxon behaves in a more controlled way under circumstances of stress, he is more liable to subsequent anxiety, while persons more outspoken in their emotional response throw off the after-effects more easily.

It is disturbing to read that Margolin and his colleagues found in a representative group of American seamen a critical attitude to the British, and an unfavourable comparison of them with the Russians as hosts. The American "resents the lorry that goes lumbering by without giving him a lift back to his ship, the cool British manner, the failure to provide him with a warm welcome at the end of his trip and the lack of any gesture which would recognise the dangers to which he has been exposed." This is a serious reflection on our hospitality, and one which could surely be remedied.

GALLOP RHYTHM

THE four cardinal signs of impending dissolution in patients with cardiovascular disease—gallop rhythm, pulsus alternans, Cheyne-Stokes respiration and subsultus tendinum—have been recognised for many years, but what we have learnt about their mode of production has taught us that there are exceptions to their ominous significance. Gallop rhythm, for instance, has been subdivided into various types, such as protodiastolic, mesodiastolic, presystolic and systolic; for practical purposes the protodiastolic type is the only one carrying a grim prognosis, and it is this type which the old school of clinicians referred to when they talked of gallop rhythm. Garvin,[6] in an analysis of the records of 790 consecutive adult patients who died of heart disease and on whom necropsy was performed, found 199 cases in [illegible] osed clinically. In accordance with current teaching he found hypertensive heart disease and coronary disease to be more commonly accompanied by gallop rhythm than any other form of heart disease, the incidence in the former being 35 and in the latter 31%. Only 7 of his 67 cases of syphilitic heart disease had gallop rhythm, an unexpectedly low figure, for heart-failure with aortic incompetence has always been considered one of the commoner conditions associated with gallop rhythm; the discrepancy may be explained by the fact that he classifies all these cases under the one heading and does not indicate how many of them had aortic regurgitation. Only 12 of the 119 patients who died of rheumatic heart disease had gallop rhythm, while 10 of the 54 who were found to have cor pulmonale showed it. Among the patients who died of hypertensive heart disease the average age at death of those with gallop rhythm was 49·5 years, compared with 58·8 years for those without gallop rhythm. Among the deaths from coronary disease the figures were 57·3 years with gallop rhythm and 64·4 years without. These differences are statistically significant. As was to be expected, there was no evidence of a relationship between sex and gallop rhythm. Unfortunately Garvin does not say how long patients survived after gallop rhythm was recognised, but it is helpful to have his statistical confirmation of old-established teaching.

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[1] Poe, E. A. The Narrative of Arthur Gordon Pym of Nantucket, New York, 1838.

[2] Critchley, M. Shipwreck Survivors, Churchill, 1943. Pp. 119. 7s. 6d.

[3] Anderson, E. W. *J. R. nav. med. Serv.* 1942, 28, 361.

[4] Margolin, S., Kubie, L. S., Kanzer, M. and Stone, L. *War Med.* 1943, 3, 393.

[illegible] *Lancet*, 1943, i, 223.

[illegible], 205, 311.

PHYSIOLOGICAL ACCOMPANIMENTS OF THINKING

ACCORDING to J. B. Watson, it is not true to say that we think with our brain, any more than to say that we walk with our spinal cord. To the physiological psychologist "thinking" is something which accompanies the whole stimulus-response (S-R) mechanism in its various degrees of complexity. When a waiter drops a hot plate, there has been a stimulus affecting the end-organs for heat followed by relaxation of the grip. This has been accompanied subjectively by a feeling of pain followed by a kinæsthetic sensation of muscle movements. These subjective experiences would represent on this view an elementary form of thinking. In the more complicated forms of thought, the S-R mechanism is still there, but in more complex form. On the afferent side, the imagery may be visual, auditory or kinæsthetic in varying degree, while on the efferent side there may be more or less overt movements in the way of gestures, facial expression, visceral tensions, and laryngeal or ocular movements. Studies along these lines have shown that in many people movements of the tongue and larynx, not amounting to speech, are used in thinking. Golla[7] at the Maudsley Hospital investigated by means of a novel apparatus the respiratory changes accompanying the different types of thinking. When visual imagery was employed—and some people use it almost exclusively—breathing was more or less regular, but if there was a tendency to vocalise and to use kinæsthetic imagery it was irregular. This work was implemented by later studies by Spencer Paterson[8] and Wittkower[9] on types of mental imagery and respiration in the psychoses. In this connexion it is of interest that responses to colour and kinæsthetic sensations have been found valuable in Rorschach's tests to distinguish different psychological types. In a new investigation being carried out by Golla, Hutton & Grey Walter[10] at the Burden Neurological Institute, the alpha rhythm in the EEG has been found not to be so "disappointingly constant" as Adrian & Matthews[11] had supposed. This investigation largely depends on an ingenious device described by Grey Walter,[12] in which four tuned reeds are energised by the output from the electroencephalograph. Each reed has a contact wire which dips in and out of a mercury cup as it vibrates; from the frequency of vibration and the time that the contact with the mercury persists the experimenter can analyse the alpha rhythm more delicately. By use of this method, the alpha rhythm has been divided into three types, depending on the hypothesis that the rhythm itself is a sign of inactivity in the visual association areas of the cortex and that activity in that area inhibits it, a supposition for which there is considerable evidence. The first type of rhythm distinguished is extremely small, so that the effect of opening and shutting the eyes could not be traced on the record—the minus or "M" type. In the second type there is a clearly visible rhythm which is present when the eyes are shut, but which is blocked or greatly [illegible] either by opening the eyes or by mental exertion of a fairly vigorous type—the "R" or responsive type. The third is an alpha rhythm of similar size which is present at all times, whether the eyes are open or shut and irrespective of the degree of mental activity of the subject—the "P" or persistent type. The crucial test in each case is to see whether the rhythm is different when the subject has his eyes open from what it is when his eyes are shut, and whether it is affected by calculations done with the eyes shut. On the whole the subjects with scarcely perceptible rhythm were those whose imagery was visual, so that no alpha rhythm appeared. Even when the eyes were closed, some visual imagery was still employed. In the "P" type, auditory-kinæsthetic imagery was being used and the visual area inhibited so that the alpha rhythm persisted. Even the stimulus of opening the eyes was not sufficient to interfere with [illegible] essentially auditory-kinæsthetic imagery. The "R" group includes those who show alpha rhythm [illegible] opening the eyes, and also some who show it when [illegible] ing visual imagery. Further investigation may greatly modify these tentative findings, yet it is interesting [illegible] types of thinking may in time be distinguished *not only* by studying the sensory areas employed and the peripheral changes such as those of respiration, but also centrally, by investigating changes in the electrical *potential of the brain itself.*

NEW PRINCIPAL OF LONDON UNIVERSITY

MR. HAROLD CLAUGHTON was educated at Radley and Trinity College, Oxford. On leaving Oxford [illegible] went to India as assistant officer in charge of the Imperial Record Department, working under the late Sir Denison Ross, who, in his autobiography, described him even at that time as a remarkable man and a most efficient worker. During the last war, rejected for the army on account of short sight, he was in the Military Intelligence Department from 1915 to 1918. In 1919 he was appointed assistant secretary to the Surplus Government Property Disposal Board, becoming later secretary, which post he held *till 1923*. In *1929* he was app[illegible] clerk to the newly constituted Court of the University of London. He held this post till 1941 when he was appointed acting principal of the university. He writes admirable English, is a consummate documentary draughtsman and has a dry and somewhat mordant sense of humour; all attributes of value to the executive officer of a large and complicated university machine. Though not a medical man Claughton has a wide and sympathetic knowledge of the needs and aspirations of the London medical schools and is very much *persona grata* to the medical members of the senate and to the faculty of medicine generally.

A JOINT conference on the administration of the medical services has been arranged by the Institute of Public Administration and the National Association of Local Government Officers (metropolitan area education committee) *and will be held at County Hall, S.E.1, on Saturday* and Sunday, Sept. 11 and 12. The speakers will include Dr W. Allen Daley, Prof. R. M. F. Picken, Dr. J. A. Scott and Dr. Charles Hill.

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7. Golla, F. and Antonovitch, S. *Brain*, 1929, **52**, 491.
8. Paterson, A. Spencer, *J. Neurol. Psychopath.* 1934, **14**, 323; 1935, **16**, 36.
9. Wittkower, E. *J. ment. Sci.* 1934, **80**, 692.
10. Golla, F., Hutton, E. L. and Grey Walter, W. *J ment Sci.* 1943, **89**, 216.
11. Adrian, E. D. and Matthews, B. H. C. *Brain*, 1934, **57**, 355.
12. Grey Walter W. *J. ment. Sci.* 1943, **89**, 222.

Medicine and the Law

"Due Inquiry"

CONCLUSION OF THE SPACKMAN CASE *

THE House of Lords judgments in the Spackman case will rank with *In re La Mert* and *Leeson v. General Medical Council* as a classic exposition of the duty of the GMC in respect of the removal of a practitioner's name from the Register. The result may be inconvenient, but, as Lord Atkin observed, "convenience and justice are often not on speaking terms." It is much more inconvenient, he says, that a medical practitioner should be judged guilty of an infamous offence by any other than the statutory body. He does not accept the view that the GMC is ill qualified, by comparison with a judge of the Divorce Court, to form an opinion upon such a matter as a charge of adultery with a patient. "I can imagine no tribunal better qualified to draw deductions from the proved conduct between a doctor and his female patient than the very experienced body of men, for instance, who sat on the present inquiry."

REVIEW OF THE GMC PROCEEDINGS

The facts giving rise to Dr. E. D. Spackman's successful appeal were summarised by the Lord Chancellor with his usual lucidity. Early in 1941 the late Mr. Justice Langton tried the divorce proceedings of Pepper *v.* Pepper (Spackman cited). The original petition was that of the wife who asked that her marriage be dissolved because of her husband's cruelty. Her allegations were supported by the evidence of her medical attendant,
cruelty Mr. Justice
Dr. Spackman in toto
The husband, in his answer to the divorce proceedings, alleged that his wife had frequently misconducted herself with the doctor. The judge found that these parties had committed adultery during the years 1936, 1937 and 1938; "this conclusion," he said, "is not, I think, open to any reasonable doubt at all." He therefore granted the husband a decree nisi of divorce with costs against Dr. Spackman and ordered the latter to pay the husband £1000 damages. The decree nisi was made absolute on Aug. 26, 1941. As Lord Wright observed, the damages were paid and there was no appeal.

The GMC subsequently notified Dr. Spackman that it would meet on Nov. 26 to consider the information it had received and to decide whether or no his name should be removed from the Register under section 29 of the Medical Act. The notice made the usual request that any answer, admission or other communication respecting the charge or the defence thereto should be sent to the council 21 days before the day appointed. No written answer arrived but Dr. Spackman attended
pers
note
arge
Langton's judgment. The solicitor to the council opened the case and produced a certified copy of the decree absolute. Dr. Spackman's solicitor, Mr. O. Hempson, admitted that his client stood in a professional relationship with Mrs. Pepper, but submitted that he should be allowed to call certain evidence not laid before the Divorce Court, with a view to challenging the correctness of the judge's conclusion on the issue of adultery. These fresh witnesses, he intimated, would provide corroboration of Dr. Spackman's denials of misconduct. Mr. Hempson admitted that the proposed new evidence had been available at the hearing of the divorce petition and could with reasonable diligence have been called there; he added that, if he had then been advising Dr. Spackman, he would have called these witnesses in the Divorce Court. The council's legal assessor explained that in such circumstances the Court of Appeal, on an appeal from the High Court, would not consider that there was adequate reason for allowing the
called; it was the council's
ly to hear evidence in rebuttal
[illegible] Mr. Hempson then addressed the council and called evidence in support of his client's high reputation. After deliberation, the president of the council announced that the facts alleged in the charge had been proved to the council's satisfaction, and directed Dr. Spackman's name to be erased from the Register.

As is well known, section 29 of the act authorises such directions on two grounds—first, on a practitioner's conviction for felony or misdemeanour, and secondly,
oner is judged
ssional respect.
that the coun-
where there is a
conviction for crime, but must make "due inquiry" before finding a practitioner guilty of infamous conduct. Was there a "due inquiry" by the council if the council merely accepted the results of the inquiry by the Divorce Court?

HOUSE OF LORDS ANNULS THE ERASURE

Dr. Spackman applied to the King's Bench Division for an order of *certiorari* to annul the direction to erase the name, contending that there had been no "due inquiry." The Lord Chief Justice and Mr. Justice Humphreys (Singlet
fore, the Lord Chief
in the council's proc
of justice. The Court of Appeal, however, unanimously overruled the court below and adopted the view of Mr. Justice Singleton. Lord Justice Mackinnon held that "due inquiry" involved a full and fair consideration of any evidence that the accused desired to offer, and if he tenders them, hearing his witnesses. An order of *certiorari* was granted but leave was given to appeal to the House of Lords. Now the final appellate tribunal says that due inquiry was not made and that the case must go back to the GMC to take the inquiry up again. "I do not seek in any way," said Lord Wright, "to suggest or forecast how they should hold it; the discretion and responsibility for the procedure are theirs." The Lord Chancellor said it was not disputed that the GMC, in exercising this jurisdiction, was not a judicial body in the ordinary sense; "it is master of its own procedure and is not bound by strict rules of evidence;
ts as long as it
f 1858." But
the conviction of crime, which the practitioner could not challenge, and the issue of infamous conduct on which a mere acceptance of the adverse finding of the Divorce Court would not be "due inquiry" if the council refused to hear evidence tendered to establish that the Divorce Court's finding was wrong. The problem, said Lord Simon, does not arise only over divorce proceedings. A jury's verdict of justification in a slander action, judgment for the plaintiff in an action for seduction, a bastardy order made by magistrates—these and other proceedings in a court of law might lead to a charge of infamous conduct before the council. The council might treat the courts' conclusions as prima-facie proof, but must, when making "due inquiry," permit the doctor to challenge the correctness of the conclusions and to call evidence in support of his contention. "The previous decision is not between the same parties: there is no question of *estoppel* or *res judicata*: in such cases the decision of the courts may provide the council with adequate material for its own conclusion if the facts are not challenged before it, but, if they are, the council should hear the challenge and give such weight to it as the council thinks fit." In divorce proceedings the decree "provides a strong prima-facie case which throws a heavy burden on him who seeks to deny the charge, but the charge is not irrebuttable." In weighing the value of rebutting evidence produced before it, the council is entitled to bear in mind that it is not given on oath and that the council cannot compel the attendance of other witnesses which might refute it. "It is further entitled to attach to the conclusion of the Divorce Court all the weight that is due to the effect upon a trained judicial specialist of sworn testimony given, subject to cross-examination, before a tribunal which can compel attendance of witnesses and production of documents." But all this does not exonerate the council from refusing to allow the accused to put before it relevant matter in support of his denial. "If it was considered desirable to make the

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* Dr. Spackman's successful appeal was undertaken by the Medical Defence Union.

decision of the Divorce Court conclusive, and so to prevent the possibility of a second hearing on the issue of adultery, this could only be brought about by amending section 29." Both Lord Simon and Lord Wright drew attention to the different language of Parliament in the Clergy Discipline Act of 1894 where a mere finding of misconduct against a clergyman in a law-court is a ground for removing him from his post without any further inquiry.

OTHER POINTS IN THE JUDGMENT

The speeches of other learned lords referred to other matters of interest. Lord Atkin emphasised that, if a Divorce Court finding is "prima-facie evidence" of infamous conduct, the very conception of prima-facie evidence involved the opportunity of controverting it. Lord Atkin made a novel point by doubting whether it is true that the GMC have no power to administer an oath. "This proposition, which is found in other cases and in the judgments of the Court of Appeal in the present case, appears to ignore the provisions of Lord Brougham's Evidence Act (14 & 15 Vict. c. 91. s. 16)." Lord Atkin also remarked that the extracts from the shorthand notes of the divorce proceedings did not contain any evidence at all of adultery but related to the absence of doubt in the mind of the Divorce Court judge. "But the question does not turn upon the Judge's absence of doubt, but upon whether the members of the Medical Council are themselves convinced of their fellow-practitioner's guilt."

At least two of the Lords of Appeal commented on the omission by the GMC to observe the practice enshrined in its own rules. Rule 9 in chapter XIV provides that, if there is no complainant (as in the Spackman case) before the council, the council's solicitor will state the facts and produce the evidence so far as the case is not admitted, and the practitioner will then be called upon by the president to state his case and to produce the evidence in support of it. To produce the evidence in support of his case was just what Dr. Spackman had been prevented from doing. Lord Wright threw out a hint that the rules can be changed. Rule 9, as it stood, satisfied, he thought, the essential requirements of justice and fair play. There was no analogy between the practice of the council and the practice of the Court of Appeal where the calling of fresh evidence is discouraged out of respect to the maxim *ut sit finis litium*—i.e., that litigation shall not go on for ever. Earlier in his speech Lord Wright had commented on the nature of the GMC's jurisdiction. "It has not merely to ascertain the facts but to decide what standard to apply"; it has to say whether the particular conduct is infamous "not in the abstract but 'in any professional respect.'" There is, he recalled, no appeal from the council's decision, but his language lent no support to those who sometimes belittle the council's jurisdiction, authority and standards.

> "Such tremendous powers, which may close a man's professional career and ruin him financially and socially, have been vested in the Council by Parliament from a faith both in the members' expertness in regard to that grave issue and to their moral gravity and trustworthiness—such is the eminence of the Council, and so completely representative is it of a great profession, the honour and integrity of which are of the highest importance as matters of public policy."

Charge of Rape against Doctor

The jury at Birmingham assizes failed to agree at the trial of Mr. K. M. Pardhy, FRCS, aged 68, who was charged with the rape of Mrs. Pearson when she visited his consulting-room on June 10 for a medical examination. The object of the visit was to ascertain if she was pregnant. Her husband went with her and sat behind a screen in the room. Suddenly Mrs. Pearson shouted out "John" to her husband; he came round the screen and told the accused that he had never examined his wife. The accused replied "Yes, I have; your wife is not pregnant; she is neurotic." Mrs. Pearson asked her husband to take her away. The accused denied the offence. The prosecution called medical evidence to prove that a proper examination would perfectly easily have disclosed that Mrs. Pearson was pregnant. defence called Prof. L. P. Gamgee, FRCS, of Bir- University, who gave his opinion, based on physiology, that the offence would have been impo judging from the evidence given as to the position of th *complainant and the accused at the time.*

Mr. Justice Wrottesley, in his summing up, emph the importance of the case to the parties and to public in view of the relationship between doctors women patients. Reviewing the evidence, he that the issue depended largely on Mrs. Pearson testimony. Only three persons knew what went on the room. Of those three only one could really say w occurred; Mrs. Pearson was placed in such a p that she could not see what was going on; Mr. Pe sat with his back to a screen. In his cross-examinatio of Mrs. Pearson, Mr. G. D. Roberts, K.C., attacked he character. She admitted that a neighbour had complained about her conduct with the neighbour's husband but she added that there was no ground of complaint She admitted that she had reported to the police a man wh came to look over the house, followed her into the kitche pushed her on to a chair and kissed her. A man wa brought into court in custody of a warder. Mr. Roberts asked her if she knew the man and if she had once slep a night with him. She replied that she had never see the man before. As the judge was careful to explain *the jury, such a question is permitted in cross-examina*tion; it cannot be excluded as irrelevant; it might to establish that the witness was a loose woman. " the same time our law is quite definite in this; if th witness denies the allegation, the answer must be tak as final."

Detailing the defendant's evidence of what happen in the consulting-room, the judge commented that it were true, it was an end of the case and he must found "not guilty"; if there were anything in the st of Mr. and Mrs. Pearson which shook their faith, the ju must acquit him. "You may find it impossible believe it; that is for you." The case bristled wit improbabilities; "perhaps the most improbable thi of all is that Mrs. Pearson suddenly thinks there something wrong when there is not, suddenly sits up a calls out 'John,' and then there follows the scene whi the accused described when in fact he had done nothing

The jury returned to court after an absence of 1½ hou the foreman stating that they could not agree. Af further observations from the judge they returned aga still unable to agree. The case stands over for re- at the assizes in December.

Changed Death Certificate

During an inquest at Warwick at the end of July coroner invited and obtained from the jury a of the conduct of the Leamington registrar of births deaths who had asked a doctor to alter a death cer

The deceased, Mrs. Lewis, was admitted to the W ford Hospital on Dec. 20 last after, it was said incomplete abortion. In his summing-up the c observed that there seemed no doubt that Mrs. procured the abortion herself by means of a s An operation was performed at the hospital, but patient died on Jan. 2. The body was exhumed Warwick cemetery.

Dr. Agnes K. Leslie of the Warneford Hospital evidence that she issued a death certificate giving cause of death as pelvic cellulitis and septic abort Mr. Reginald Wilkins, the registrar, she said, tele to her the same evening, asking if she would mind using the word "abortion"; if she would use the "miscarriage" instead, he would not have to the police and the trouble of an inquest would be a The registrar's evidence was that, on receiving certificate, he telephoned to ask if the abortion natural one or one induced by artificial means. Leslie told the coroner that she refused to al certificate but said she would consult a medical colle Dr. J. J. B. Sebastian, senior resident surgical at the hospital, testified that Dr. Leslie consulted on the point: he advised her not to alter her certifi but he suggested she should consult Mr. E. G. D FRCSE. hon. surgeon to the hospital, who had been ing Mrs. Lewis privately. Dr. Leslie exp position to Mr. Dingley, who disagreed with the ficate; he considered the cause of death to be u and miscarriage. Dr. Leslie thereupon sent a note registrar, saying that Mr. Dingley, whose private p

Irs. Lewis had been, wished the cause of death to be iven as uræmia and miscarriage and that a second ·rtificate, worded accordingly, was being sent. Mr. ingley told the coroner that he accepted responsibility ·r the altered certificate; he was of opinion that death as due to uræmia arising from a blood transfusion. r. J. M. Webster, FRCSE, director of the West Midland orensic Laboratory, testified that he was present at the chumation and that he made a post-mortem examination. In his opinion the first certificate, attributing ath to pelvic cellulitis and septic abortion, was wrong; ath, he considered, was due to uræmia, anuria following blood transfusion, and abortion.

Mr. Dingley stated at the inquest that the medical ofession felt very strongly that it was not their duty report deaths to the coroner. By his questions and his summing-up the Warwick coroner naturally and operly showed himself anxious to clear up any suggestion of an underlying motive on someone's part to event the matter becoming known to the coroner. ie jury might, he said, come to the conclusion that the gistrar's conduct was highly improper. "You may ink it is to be regretted that Dr. Leslie did not stand r ground and refuse to withdraw her first certificate; must confess I do not quite understand why Mr. ngley countenanced it." In returning a verdict that ath was due to uræmia and abortion self-induced, the y added a rider that the registrar exceeded his duty communicating with Dr. Leslie. Indeed, as the oner had remarked, "If Mr. Wilkins's conduct was rect, you may wonder why the office of coroner is still ained in this country."

Special Articles

COMPREHENSIVE MEDICAL SERVICE

REPRESENTATIVE COMMITTEE'S SUGGESTIONS

THE discussions between the Minister of Health and committee representing the medical profession on establishment of a comprehensive health and re- [illegible] a white-paper [illegible] The purpose [illegible] explore, with [illegible] roblems raised Assumption B of the Beveridge report and to put ard the views which they believed to be those of majority of the profession. It had no power to mit the professi [illegible] mmittee for short) has be [illegible] Medical ociation's *General* [illegible] *on* (1930, sed 1938) and the draft interim report of the Medical nning Commission (June 1942) viewed in the light of cisms made by constituents of the commission and rs.

he white-paper will also not commit the medical ession, and the RC has urged on the Minister that it ld be confined to a statement of the problems and commit the Government to any one solution of . This would facilitate free discussion by the ic and by doctors and other affected groups. The mittee has reached the conclusion that there should n early agreement by the profession on the fundatal principles which would form the basis of any te reorganisation of health services whatever the ents of the white-paper. It has therefore prepared following statement for consideration by its constent bodies.

THE ELEVEN PRINCIPLES

The health of the people depends primarily upon the *social and environmental conditions under which they* [illegible]

The efficiency of a country's medical services, both preventive and curative, depends upon the available medical and scientific knowledge, upon the character and extent of medical education, and upon the absence [illegible] research should be greatly increased; medical education, both undergraduate and postgraduate, should be maintained on a higher standard and be adapted to modern needs; the facilities for postgraduate medical education should be greatly increased; and, wherever economic barriers prevent an individual taking advantage of medical services, such barriers should be removed.

(3) Subject to these general and overriding considerations, the functions of the state should be to coördinate existing provision, both official and non-official, to augment it where necessary, and to secure that it is available without economic barrier to all who need it. The state should confine itself within these wide limits, invading the personal freedom of both citizen and doctor only to the extent which the satisfaction of these functions demands.

(4) The state, while assuming responsibility for the organisation and provision of medical services, should not assume control of doctors rendering individual or personal health service. It is not in the public interest that the state should convert the medical profession into a salaried branch of central or local government.

(5) Free choice of doctor should be preserved as a basic principle of future health services, and no administrative structure should be approved which does not both permit and encourage such free choice.

(6) It is not in the public interest that the state should invade the doctor-patient relationship. The loyalty and obligation of a doctor rendering personal health service to an individual patient should be to that patient and to none other. This presupposes that, in so far as the doctor is employed, he should be employed by the patient, to whom his responsibility will lie.

(7) The ideal doctor-patient relationship can continue to exist only where that free choice of doctor is reinforced by a method of remuneration of doctors which is based on the number of persons or families selecting a doctor, or related to the items of service rendered.

(8) Every member of the community, whether entitled to avail himself of any official health service or not, should be free, if he so chooses, to utilise the services of the doctor of his choice, whether that doctor is a member of the official service or not. Nothing should be done to encourage the splitting of the medical profession into two groups, the official doctors and the non-official doctors.

(9) The work of consultants and specialists should be based on the hospital. Private consultant practice should continue in private wards for those persons who prefer to go into those wards.

(10) The central administrative structure set up by the state for the central administration of the medical service in the future should be a body concerned only with civilian health services, but it should be responsible *for all civilian health services administered by* central government. The minister to whom this central administrative body is responsible should be advised on medical matters, including personnel, by a medical advisory committee, representative of the medical profession. Locally, new administrative bodies, responsible to the central authority, should cover wide areas and should be representative, directly *or indirectly, of the community served,* and, *in appropriate numbers,* of the local medical profession and [illegible] advised on [illegible] local medical [illegible] of the local medical profession. These administrative changes should be regarded as foundation changes to be completed before other changes are initiated.

(11) All branches of medical practice should be regarded [illegible] for other branches of practice.

In submitting these eleven principles to its constituents the RC suggests that, pending the consideration and completion of the foundation administrative changes mentioned in section (10), Assumption B should be satisfied by an extension of National Health Insurance to include dependants of insured persons and others of like economic status, and to cover consultant and specialist services and laboratory and hospital facilities as well as general practitioner service. Those with incomes above the existing limits could, if Parliament decides to make the service available to every member of the community, be permitted to become voluntary contributors to the extended service. The committee also advocates organised experiments in group practice, including health centres of different kinds, on the results of which future developments in group practice would depend.

CANADA

CANADA is a large country and a peripatetic correspondent could doubtless find interesting material for a letter in a dozen places, but travel is restricted, taxation is high and Victory loans are called for once a year, so the letter-writer must sit like Montaigne in his tower and deal with matters as he sees them.

* * *

The Canadian Medical Association held its annual meeting in Montreal on June 15. No scientific sessions were held and the attendance was limited to the council. The chief item of business was a discussion of the Health Insurance Bill now before the Parliament of Canada. It is still impossible to be definite about the provisions of this bill as it affects the medical profession. The measure is still in the discussion stage and modifications of the original draft are being made from time to time.

* * *

The Canadian Association of Clinical Surgeons, which has been in existence for 35 years, has a limited membership drawn from the departments of surgery in the universities of Manitoba, Ontario and Quebec. Normally two sessions are held each year. The regular programme is three half days in as many hospitals and a dinner in the evening of the first day at which the business of the association is done. On June 4 and 5 the meeting was held in Toronto. The staffs of the Toronto General Hospital, the Hospital for Sick Children and the Christie Street Hospital of the Federal Department of Pensions and National Health provided the material for discussion. Dr. R. I. Harris demonstrated the use of the Stader splint which was first shown in Toronto by the inventor and Surgeon-Commander Kresz of the United States Navy about a month ago. The chief subject for discussion at the dinner meeting was the certification of specialists under the proposed national health insurance scheme which is now before Parliament. It was agreed that the Royal College of Physicians and Surgeons of Canada should be charged with this duty. This body may find it necessary to admit a number of general practitioners to membership and have its charter amended accordingly. As now constituted, the fellowship is the only award granted by the college, but it is physically impossible to staff the hospitals outside the larger cities with fully trained surgeons who hold diplomas from one of the royal colleges of surgeons. A difficulty arises as to what the new class should be called. Canada is bilingual in all matters of state and there seems to be no way of translating the word "fellow" into French. French-speaking fellows call themselves "members" and are so designated in the records as written in the French language. In the Province of Alberta the certification of specialists is a function of the senate of the provincial university. Such an arrangement would be impossible elsewhere, with the exception of Manitoba.

* * *

Sister Kenny visited Toronto early in June at the invitation of the minister of health in the Ontario government. She gave a large audience in Convocation Hall, University of Toronto, an exposition of her method of treating cases of acute poliomyelitis. Hamilton, Ont., has nurses trained in the Kenny School in Minneapolis, USA, but the staff of the Toronto Hospital for Sick Children are not yet convinced. Their success in rehabilitating victims of the epidemic of 1936 has made them cautious in accepting radical changes in treatment. You will recall that Cromwell before the Presbyterian Assembly in Edinburgh, said, "I beseech the brethren . . . that ye consider whether ye may be wrong." Perhaps the same might be said to Sister Kenny—and the exponents of the more established systems.

In England Now

A Running Commentary by Peripatetic Co

THE core shop of a *foundry* is not a pleasant Dirt and fumes and temperature combine to make particularly undesirable on a warm summer On such a day I was hurrying through such a core s as fast as decency would permit when one of the asked me how I would like to work there. I had hesitation in replying that I should hate to work and his comment was that the firm paid them " money," but that it was really dear money becau cost him three or four pints of beer to slake his before he went home of an evening. There must many men (and women in these days) who qualify dirt money. Sometimes they get it, sometimes Much depends on the tradition of the job: in some dirtiest jobs go as a matter of course to the least and lowest paid—workers, sometimes to the most recruits, and the question of extra pay does not It may be that the circumstance calling for extra is not so much dirt as danger. If an occ specially dangerous it should carry special —"danger money"—but, as Sir William Bev says in his report, to give danger money only in the of higher wages, that is to say, only as long as no has occurred, is of little value, for it does not that more money is available when alone it is that is, when the danger has resulted in an accident.

The attitude of workmen to danger money and money varies. Some of them need or want the m badly as to be willing to undertake almost any work carries extra pay. Their attitude to overtime is similar. The majority prefer to be without either money, dirt money or overtime wages if they can along without; a few seem to have a genuine live dangerously, and—more remarkable—a number seem to revel in dirt for dirt's sake; which all is not far removed from the experience of the ev world. Robert Louis Stevenson, like many before him, knew that in unloved toils, even under prick of necessity, no man is continually sedulous wrote that "Of those who are found wholly in business, some are misers; some are the delightful industries like gardening; some are artists, inventors or discoverers, men lured f successive hopes, and the rest are those who live by of skill or hazard."

A good deal can be done to reduce the amount of and dangerous work. There is a whole code of law directed more or less expressly to that end and is no reason why, with improving methods (foundry construction and technique), much improvement should not be secured. Even then will remain a certain amount of undesirable w the question may come to be whether it is indeed sary or justifiable to ask human beings to If the answer is yes, then the work will have to be as little unattractive as possible not merely better wages and compensation provision but al amelioration of working and living conditions, insisting on adequate ventilation, washing faciliti the like. It seems probable that remedial action o kind will in any case be forced on industry, for o will the less desirable industries—among which mining stands out a mile—be able to recruit lab quality in the days when direction is no more. It to say that a considerable section of the people do want amenity and will not appreciate it. Dirt will not always mean simply the wherewithal to b extra pint on the way home; the experience of p baths, where the percentage of men using them from about 70 to 90 within the last twenty yea clear pointer to what can be done.

* * *

Those who know about them tell me that the have much in common with us. We certainly similar taste in humour and a common patient Griseldas if *Lady Precious Stream* is a fair of the Chinese fairy story. Seeing it played in th air without décor but in the most magnificent brought home to me once more the relative of the one (which may be merely distracting) eatrical value of the other (which serves only to focus tention on the players [illegible]

[illegible] of both sexes and ages—and their name is Legion just now—would do ell to see this admirable play if only to learn how the ad bull of physical passion can be successfully steered t of the China shop of decent family life by civilised nd self-disciplined persons who don't lose their heads.

* * *

As soon as you join the Bright Boys of pseudoscientific edicine you have to play their game of space-pinching the *Medical Directory*. It is a fine healthy game, now the height of its season, and consists in acquiring as uch print after your name as you can in spite of the blisher's rules designed to frustrate your efforts. oring is by printer's "ems," partly to make it more fficult and partly to reduce the start of those with long d multiple names. For this em is, I gather, the width the capital letter M in whatever size type you are ing, so that a surname which takes up half a line of pitals scores no more than an appointment which fills same space (why not just score by the inch? I nno). The number and length of your addresses and ephone numbers are partly a matter of luck and partly

legrees should

, otherwise the

aces of educa-

were, of course, dealt you before the game began. ring your postgraduate career it is useless to collect re than three house-appointments. Mr. Churchill and/or A.; not W) is firm; he will only print three. sent appointments

abbreviated. There is, however, one absolute iner—"Phys. i/c Radio-therap. and Electr. Dept. Yuknow's Hosp." (29 ems, I think). But the worst falls of abbreviation are presented by the (three only) rned societies. For instance, you pay three guineas year to become a member of the British Medical ociation (13 ems), and are fobbed off with "Mem. I.A." (7 ems). I can on request furnish you with entrance form of a very jolly "Fell. County Town Med.-Chir. Soc." (18 ems), which will cost a guinea a year. Only three learned papers are wed; but this is where we really spread ourselves. We t write about *Sunlight for Ratbites. No, we devise a* fumbling rigmarole, such as *Some Observations on the cts of Heliotherapy in Cases of Punctured Wounds ed by Rodents*," and score dozens of ems. Having nted this grand title, we shall have to write a turgid cle to live up to it, which is a pity, because we may something worth saying. Worse still, we may not. ears ago when I was in general practice, the ear, nose,

up

the

when I

beyond the tonsils

sessions, he replied that was just the point. He wanted to dislodge present clinical assistant, who was always getting s way and breathing down his neck, and he longed in his department in peace. My appointment was, ct, conditional on my never showing my silly face e department at all. I naturally accepted the office, performed my duties to the satisfaction of all. I was mitting in my non-attendance, and never took a lay. *Soon afterwards I left general practice, and* moved to the other side of England; but I never dered resigning my post. Up to now I have kept pretty dark, but competition is so keen these days I cannot allow good ems to run to waste. The only tion is, how best to put it? "Late Clin. Ass. to T. Dept." would be an understatement and rather ading; I was better than late. Perhaps the most factory modification would be that one they put on roads in new housing estates—"Clin. Ass. Ear, and Throat Dept. (Not Adopted)." That will be us.

Parliament

ON THE FLOOR OF THE HOUSE

MEDICUS M P

DURING the last few days of the session the House

, supplementary pensions, draft

yment assistance and a string

by private members on the day

The feeling and atmosphere of the House has been dominated by the grand news from the war fronts, but there has been some effervescence of irritation here and there. Mr. Brendan Bracken, Minister of Information, introduced a new note by suggesting that if anyone believed any of Ribbentrop's "fizzy rubbish" he should be sent not to a mental specialist but to a veterinary surgeon. This view suggests a greatly increased scope for the work of the veterinary profession in the immediate postwar world.

On the first sitting day woman-power was discussed on the basis of equal pay for equal work and woman's part in the war effort. As the result of opinions expressed in the House and outside it has now been decided to debate the call-up of the older group of women from 47 to 50 when the House reassembles and this will apply also to the proposal to

to 18 for work in the mines.

Sir George Jeffreys put th

stat

the

The

decis report and said he was sure that the new system would prove successful in making still more effective the work of the VADs. The fact that the Navy and the Air Force are not coming into line falls into its proper perspective when the numbers involved are realised. The Army employs 4500 VADs, the Navy less than 1500 and the Air Force less than 300. The criticism levelled against the abolition of the VAD commandant also loses effect when it is known that there *are only 24 in the whole country. Sir Edward Grigg* has promised to do all he can to facilitate the transition from the old to the new conditions.

Replying to the debate as a whole Sir William Jowitt said that the rate of sickness and discharge in the women's services has been greater than in the men's—and this apart from cases affected by pregnancy. This higher rate is perhaps partly due to insufficient examination of candidates on entry and it may lead to a larger proportion of pension claims than in the men's services of comparable employments. The rate of pensions, both the basic rate of 10*s.* a week and the supplementary rates which have recently been increased by 2*s.* 6*d.* a week, is still a running sore in Parliamentary debate. Mr. Tinker was among the members of all parties who put forward a claim for an increase of supplementary rates to £1 a week after payment of rent. The House is uneasy at the idea of the retired workers of the community being paid at a rate on which it is a struggle to live under present conditions.

FROM THE PRESS GALLERY

The Art of Teaching

IN a teacher's postcript to the debate in the Lords on the white-paper on education, Lord MORAN said that for twenty-five years he had been dean of a London medical school. Every year there came to that school 60 or 70 new students, and for the next five, six or seven years he watched them using the education they had already been given, applying it to the new task of becoming a doctor. The results on the whole were *disconcerting. Many of the boys lacked reasoning* power, and many were without curiosity. A student without curiosity, Lord Moran affirmed, was not a student at all. He agreed with what was said in the white-paper about the importance of the teacher, and it seemed to him that all they were doing would come to nothing unless they could find teachers of quality, for the teaching art was important and difficult. In the education of the medical student, for instance, they kept adding to the curriculum; they never took away. They asked the student to memorise a mass of facts, instead of teaching him *how to handle them. Before* they sent the student away they so contrived to educate him that he could not educate himself. He had no power of growth. Lord Moran had come to ask not how much a man knew when he qualified, but whether he wanted to learn, and if he knew how. It was easy to ask a boy a question and decide whether he knew the facts; it was more difficult to shape a question so as to make him think for himself. The great thing needed was to find out during the war which were the men whom they wished to recruit for the teaching profession.

It was commonly said that the stern fervour of these times of war changed men so that soldiers were made out of indifferent material. He did not believe that was true. War had no power to transform; it only unmasked and left men as they were themselves. The people with the battalions now on active service knew which were the men of character. Was it not a pity that we should not have some record of these men? Otherwise when demobilisation took place the just and the unjust would be thrown on the labour market together with nothing to distinguish them.

The relation between teacher and pupil was everything. Lord Moran was once asked what qualities in a man made a successful dean of a medical school, and he had answered: "If he is a sort of man who goes to see the fifth team play football on a muddy field in a downpour of rain and likes doing it, so that at the end of the game the players come to him and talk to him as one of themselves, then all other things will be given unto him." If we were to get this comradeship between teacher and pupil we must remember that you could talk to a class, but you could only teach boys and girls whom you knew. Public schools had another advantage besides moulding character which had been lost sight of. They brought together the pupil and the teacher after the day's work was done. This was brought home to Lord Moran in the early part of the war. Usually the physicians and surgeons attached to London teaching hospitals visited them three or four times a week, but when their students were scattered among half a dozen hospitals outside London, two or three of these teachers went to live and mix with groups of 30 students or so. As to the content of education, Lord Moran agreed with the parent who said that he did not mind what his boy was taught as long as he was well taught. At the Renaissance men became aware of the beauty all around them, felt a desire to instil this love of beauty into others, and used the classics for this purpose. Even now we would not quarrel with that, but science, the business of the stars, and things of that kind, interested the average boy more than any other subject. Science, it had been said by a member of their Lordships' House, was organised curiosity, and was it not the alpha and omega of teaching to arouse and inspire curiosity and hold the attention of the boy? He therefore welcomed the extension of residential schools in England so that more might profit from them.

QUESTION TIME

White-paper on Health Services

Captain Peter Macdonald asked the Minister of Health when he proposed to issue his white-paper containing his preliminary proposals for implementing the health scheme of the Beveridge report; to what extent this would affect interests other than the medical profession; and whether he would give an assurance that these interests, such as the hospitals, dentists, pharmacists, optical practitioners and others had been accorded the same facilities for consultation with his department as representatives of the doctors.—Miss F. Horsbrugh replied: The Minister hopes it will be possible to publish a white-paper about the time when the House reassembles. This would then serve as a focus for full discussion by all concerned, including many interests besides the medical profession, and it has always been the Minister's clear intention to give ample opportunity for this.

Supply of Nurses and Midwives

Sir Ralph Glyn asked the Minister of Labour whether he was in a position to make a statement regarding the supply of trained nurses and midwives as a result of the registration recently carried out by his department.—Mr. Malcolm McCorquodale replied: Just over 400,000 persons have registered under the Nurses and Midwives (Registration for Employment) Order, 1943. Of these approximately 270,000 were engaged at the time of registration in some form of nursing or midwifery work. About 130,000 were not in such work, and it is expected that most of these, on of age, family responsibilities or for some other reason, prove not to be available to return to the nursing or wifery services. Interviewing both of persons recently and of those who came forward in response to recent publicity appeal began at the appointments of the department in June and during June and July 2000 nursing and midwifery vacancies have been filled.

Accommodation for Unmarried Mothers

Dr. H. Brooke asked the Minister whether he was of the present acute deficiency of antenatal and accommodation for unmarried mothers; and whether he plans on an adequate scale for remedying this, either financial assistance to voluntary organisations willing establish hostels, or otherwise.—Mr. Brown replied: have made special arrangements to provide for certain of case transferred by the Government away from own homes. Assistance to voluntary organisations given by welfare authorities, with whom I intend to municate on this matter in the light of reco made by my advisory committee, to whom I referred question for special consideration.

Tuberculosis in Scotland

Mr. H. McNeil asked the Secretary of State for Sc how many acute tuberculous patients were waiting for pital accommodation on July 1, 1943; and how many tional beds had been made available for such patients May 1 and July 1, 1943.—Mr. T. Johnston replied. July 1, 1943, the number of pulmonary tuberculous pat who had been waiting for hospital accommodation for days or more was 1007. As regards the second part question, precise figures are not readily available for the mentioned, but between the beginning of April beginning of August 244 new beds have been occupied nursing staff has been obtained for 65 additional beds had not been in use owing to lack of staff. A furth beds are ready for occupation as soon as nursing staff obtained, and a still further 330 new beds will be immediately certain adaptations are completed, nursing and domestic staff is available. Proposals to the remainder of the waiting-list by release of further gency hospital service beds are being urgently

Mr. McNeil: Were these 244 beds included in which the Minister promised when making his annual or are they additional to the 300?—Mr. Johnston: are included, but between the beginning of April an beginning of August 244 beds were made available.

Miniature X-ray Sets

Mr. G. Muff asked the Minister of Supply wh would speed up production of the miniature X-ray ap needed for the diagnosis of tuberculosis; and how of these machines had been handed over to the Mir Health in the past three months.—Mr. Charles replied: Production is being speeded up as much as having regard to the demands for X-ray apparatus purposes. Four sets have been delivered to the Health within the past three months, and three expected to be delivered very shortly.

Status of Physiotherapists in the Army

Major Sir Jocelyn Lucas asked the Secretary of War if, in view of the fact that allied and Dominion and physiotherapists were given officer's status, while physiotherapists were given a lower rank, thus satisfaction and a drift to other branches, he would ta to remove this inequality.—Sir James Grigg replied Financial Secretary received a deputation of phy last week. Their representations are now being c

Accommodation for Hop-pickers

Mr. W. J. Thorne asked the Minister of Health of his inspectors visited and inspected hop-pickers' camps.—Miss Horsbrugh replied: The primary bility for the inspection of hop-pickers' camps rests sanitary authorities of the districts concerned. outbreak of war two medical officers of the ministr engaged on this work throughout the hop-picking Under war conditions this close supervision is not but in each civil defence region concerned, one of the regional medical officers visits the camp areas for in each season and as far as practicable keeps in tou conditions.

Letters to the Editor

THE ELEVEN PRINCIPLES

SIR,—The report of the Representative Committee to s constituent bodies should receive our warmest support. suggest three points of importance in its "General inciples" calling for amendment.

(1) Surely "The health of the people depends primarily" on their will, as well as their opportunity, to help themselves. There is far too much talk of what the community must do for the individual, as compared with what the individual can and should do for himself. The words ". . and upon the will of the people to help themselves" should be added

(10) Is "the central administrative structure . . . concerned only with civilian health services" to be a Ministry of Health, stripped of its responsibility for local government and housing? If so, local authorities will look to other departments for guidance; and health will again become the Cinderella of local government Why not call this central administration the Ministry of Health and strengthen it as suggested in the report? "Locally, new administrative bodies . should be representative . . in appropriate numbers, of the local medical profession. " Are these bodies to supplant the county and county borough councils and [illegible] If so, they must be [illegible] be representative of [illegible] t, they will not have the power of the local authority, its officers and its purse; they will be yet another extra body to complicate and delay matters. Local government cannot be split up between health matters and others The expected reform of local government will, it is hoped, provide bodies, elected by the people and directly responsible to them, who will be more and more influenced by the other "local medical advisory committees," rightly proposed in this report.

he more medical men in local, as in national, government the better. But do not let us tinker with the ocratic system, howe

t, local or national, g

y want, in favour of a

Iussolini.

atfield, Herts FRANCIS FREMANTLE.

SULPHONAMIDE RESISTANCE

IR,—In your leader of July 10 the statement is made , "an organism which has become resistant to one honamide is correspondingly resistant to all the rs." Two years ago I had arrived at a similar lusion,[1] but I recognised that further investigation necessary From this further investigation it now is th was incorrect

ven eptococci which were

tant tested by the ditch-

e method (Fleming,[2] Colebrook & Francis [1]) against sulphonamides as shown in the following table. figures indicate the width of the zone in which the th was suppressed by the different compounds imetres) —

rep rain type	Inhibition (mm.) on ditch plate by: sulphanilamide 20 mg./100 c.cm	S pyridine 10 mg./100 c.cm	S diazine 5 mg./100 c.cm	S thiazole 2.5 mg./100 c.cm.
gton	0	6	0	17
an	0	12	0	18
y	0	0	0	16
an	0	15	12	[illegible]
	0	5	6	[illegible]
r	0	0	0	0
triw *	17	16	15	22

* Sensitive control.

The results show that, of the seven strains resistant to sulphanilamide, only one was resistant to all four drugs and that six of the seven were sensitive to sulphathiazole (2.5 mg. per 100 c.cm)—a concentration which is easily obtained in the circulating blood with the usual dosage.

So far as it goes, this evidence suggests that sulphathiazole is the drug of choice in dealing with resistant strains. Only one, out of 37 strains tested so far, has proved resistant to this drug in a concentration of 20 mg per 100 c.cm. Other evidence bearing on this question, which cannot profitably be discussed here, suggests that there is much to be learned yet about this property of sulphonamide-fastness and that we should do well to avoid too definite conclusions.

Glasgow. LEONARD COLEBROOK.

THE TEACHING OF MEDICAL STUDENTS

SIR,—I feel sure most clinicians will agree with Dr. Geoffrey Evans that in the teaching of medical students "disease must be the first concern." Preventive and social medicine, in so far as they are not mere political catch-words, are related to environmental factors which should be the proper concern of Government (in which term is included the Ministry of Health and Public Medical Services) and over which the practising physician can exercise but little control. Nevertheless the basis upon which preventive medicine exists and progresses is the experience gained in the treatment of the sick throughout the ages, and the recent fall in the death-rate, as shown by the latest returns of the Registrar-General, is attributable largely to the use of the sulphonamide compounds, rather than to improved sociological conditions.

The diagnosis and treatment of disease is an exacting and whole-time occupation of immense importance to the individual and to the nation. Man is a cyclical animal born to decay and perish, and in the New World, whether it be brave or otherwise, death in his varied and stealthy forms will be ever knocking at the door. He who wishes ' ical medicine will be wise two masters; his vision m[illegible] unobscured by the misty ambiguities of "social medicine" and "positive health"—phrases, to tell truth, which smack more of the politician than the scientist, characterised rather by their slogan appeal to the unthinking than by their relation to any intellectual concept. MacNair Wilson sums up the position well in his *British Medicine*.

> "Medicine however stands or falls by its practice It is clinical or it is nothing and the work done at the bedside is the foundation as it is also the measure of its success"

The cynic might add that medicine is clinical or it is—politics.

Sawbridgeworth GORDON BURTON.

GAS GANGRENE IN THE MIDDLE EAST

SIR,—Your leading article of July 31 states that a fatality of 50% shows how little progress we have made in 25 years Is the explanation possibly to be found in your statement that "The best prophylactic of gas gangrene is early and radical surgery"? J. F. Kelly and D. A Dowell in *Roentgen Treatment of Infections* (Year Book Publishers, 1942, p. 148) show a mortality of 11.5% in 381 cases. Having some little experience in the X-ray therapy of inflammatory conditions—but not of gas gangrene—I brought the matter to the notice of the appropriate authorities some twelve months ago, and suggested that a lorry or an aeroplane should be equipped with a suitable X-ray apparatus so that a controlled investigation into the value of X-ray therapy in gas gangrene might be carried out in the field. The replies received from both British and American Army authorities were unfavourable. I don't know whether any of the 58 men who died in the Middle East could have been saved by radiotherapy, but neither will anybody know until it *is* tried.

St. Bartholomew's Hospital, E.C.1. RALPH PHILLIPS.

*** In the early days of the war the British Army considered the provision of mobile X-ray equipment for the treatment of gas gangrene in the forward areas. Such mobile units would need to work in front of the casualty clearing stations to be effective in fulminat

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ebrook L and Francis, A. F. *J. Path Bact.* 1941. 53, 1[illegible]3.

ming, A *Proc. R. Soc. Med* 1940-41, 34, 342.

cases, and this was thought impracticable. The case for the use of X rays in gas gangrene, summarised in these columns three years ago (*Lancet*, 1940, ii, 885), has not carried conviction in this country; it largely stands or falls on the evidence of Professor Kelly and his associates at St. Catherine's Hospital, Omaha.—ED. L.

THE MEDICAL DIRECTORY

SIR,—To maintain the accuracy of our annual volume we rely upon the return of our schedule, which has been posted to each member of the medical profession. Should the schedule have been lost or mislaid we will gladly forward a duplicate upon request. The full names of the doctor should be sent for identification.

104, Gloucester Place, W.1. J. & A. CHURCHILL, LTD.

MEDICAL SUPPLIES IN AUSTRALIA

APART from the production of ether and a few inorganic substances, Australia had no drug industry before the war. The reasons were economic—there was not a large enough market to make the manufacture of synthetic substances profitable. It was similarly more profitable to import plant drugs than grow them. But when Japan entered the war home production of drugs became of urgent importance. *With an immense amount of investigation undertaken in all* parts of the Commonwealth satisfactory processes have been evolved. Morphine, digitalis, caffeine, theobromine, atropine, sulphanilamide and nicotinic acid are now being produced in sufficient quantities to satisfy home requirements, and before long many other organic and inorganic drugs will be produced on a commercial basis. The Council for Scientific and Industrial Research and the Australian Association of Scientific Workers are exploring many different technical fields. Thus, before the war the United Nations relied on Japan for supplies of agar-agar, but in the last two years steps have been taken to make Australia and New Zealand a source of supply both for themselves and the other Allies. Several seaweeds have been found suitable, but *Gracilaria confervoides* is the most abundant. Australian agar has a higher ash and lower nitrogen content than the Japanese variety, but it has proved suitable for bacteriological media and for the jelly round canned meat. One Australian firm is close to production on a commercial scale and two others are engaged on laboratory studies, but no dried agar has yet appeared on the clamorous market.

Parallel development has taken place in the manufacture of surgical instruments and laboratory apparatus. Australia can now provide herself with almost all essential surgical equipment, and should soon be independent of overseas supplies of scientific glassware.

The supply and consumption of medical materials are regulated by the Medical Equipment Control Committee. When this committee was appointed 2½ years ago under National Security Regulations, its first task was to compile a minimum list of drugs needed for the treatment of disease and formulate a policy for obtaining essential supplies whenever and wherever available. It was given wide powers, which include the regulation or prohibition of purchase, sale, use, storage and production of all goods and appliances used for medical, surgical, dental or veterinary purposes. It has aimed at increasing stocks of essential imported items, encouraging home production, and controlling consumption and distribution.

Four subsidiary committees have rendered valuable services. The Surgical Instrument Panel has reorganised the instrument-making industry on a war basis by securing priorities for the supply of materials and men, and obtaining government financial aid for firms making essential instruments; it is closely linked with the contract board which purchases instruments for the Services. The Committee of Scientific Liaison Officers, whose job is the correlation of scientific research with commercial production, has been behind much of the development of home-production of new drugs. The Federal Committee of Wholesale Drug Firms, formed when the firms agreed to unite in building up a supply of essential drugs, has kept an eye on distribution, and has introduced a scheme of voluntary rationing which covers drugs in limited supply. The Pharmaceutical Advisory Panel drew up an emergency formulary of drugs manufactured in Australia, and has lately completed an Australian War Pharmacopœia for use throughout the Commonwealth: this advocates simplicity in prescription writing, and the avoidance of placebos, however well established by tradition.

Other useful work done by the control committee includ a widespread public economy campaign, the control of i export of essential drugs, and arrangements with the Control Board for transport of supplies to outlying parts Australia. In a recent report, Sir Alan Newton, chairman the committee, described it as a unique system of medi equipment administration so far as the United Nation concerned. If it is to overcome the supply difficulties w are certain to arise in the future, he said, "it must steadfastly to the belief that the end of the war is two away today and will still be two years away tomorrow.

THE DUST HAZARD

CHRONIC pulmonary disease is one of the risks menace the workers in a hazardous employment although, happily, it is not equally intense in all fields the total amount of disability it causes major problem in the industry. Silicosis, chief of occupational pulmonary diseases due to dust, c coal-miners under conditions determined by the and methods of working. Other forms of pne differing radiographically and pathologically silicosis are also found. They are unequally distri with a higher incidence in the anthracite area of Wales than in the rest of the country, a feature parallel in the anthracite fields of the USA and the This was fully described in the first report on pulmonary disease in South Wales coal search for causes was carried on along with the survey described in the first report and in the same and the results of these environmental studies are published as the second report[2] covering a vast of detailed work on the concentration, composition particle-size distribution of the dust, the chemical mineralogical constitution of the strata and the as to temperature, humidity, air movement and presence of fumes in the working places in the From the examination of the air-borne dust at the ing places a significant association was found between incidence of the disease and (*a*) the average mass tration of the total air-borne dust, and (*b*) the concentration of the ash obtained from this dust; was evidence too of this association in the calculated concentration determined from counts of parti air-borne dust, especially of particles below 5 mi size. Chemical and X-ray diffraction analyses sho that, in general, the dust from the mineral ma anthracite mines with a high incidence of the disease more quartz than that from low incidence mines, these differences were not so striking as was the g similarity between the samples irrespective of the in ence of the disease, and a closer study of the coal itself is suggested in view of a possible differential on the lung of coals of different rank. Petrol studies suggest that the incidence of the diseas positively associated with the geological changes by pressure, it increases as the rank of coal changes bituminous coal to high-grade anthracite; this tion may be indirect. In this connexion there petrological problems which merit further study, example, the occurrence of secondary quartz nuclei in groundmass of the strata and the distribution of min which modify the action of silica. Apart from dust other factors present in the mine could have, at only a contributory part in the development of disease. More work must be done before the parti constituent of the dust responsible for causing the di is identified, if, indeed, there be such a constituent, it can be held as proved that dust is the enemy. efforts towards its suppression have been intensifie technical measures. Additional mines medical in tors have been appointed, and more evidence should be available for assessing the risk of pneumoconio the coal-mines and giving added precision and effec ness to preventive measures.

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1. *Spec. Rep. Ser. Med. Res. Coun., Lond.* No. 243, 194
2. *Ibid*, No. 244, 1943. HMSO. 10*s.* 6*d.*

Sir ARTHUR RUCKER, at present chief civil assis the Minister of State in Cairo, is shortly to res appointment as deputy secretary to the Ministry of Mr. J. C. WRIGLEY who has been acting in his will continue as an additional deputy secretary.

Obituary

HAROLD BECKWITH WHITEHOUSE

KT, M S LOND, CH M BIRM, F R C S, F R C O G

Sir Beckwith Whitehouse, professor of midwifery and iseases of women in the University of Birmingham, ied with tragic suddenness in London on July 28 in his 1st year. He was returning from BMA House where he ad just been invited to preside over the Association for a second year, and was apparently at the top of his form although his friends had been aware of danger signals neglected at the call of duty. He was richly endowed with qualities of mind and heart which made him a master of his craft, an inspiring teacher and an ornament to the Royal College which he helped to found.

Underwoods

Harold Beckwith Whitehouse

was in no doubt about his choice of career and after a round of house appointments at St.

the Maternity and United
als he visited hospitals at
tton and Stourport, and
lvern. Specially dear to
years with the Lucy Baldwin maternity at Stourport.
was a deft and quick operator, ensuring success by ention to detail and enjoying its demonstration. t he was much more than that, for he was a keen dent of physiology and of the scientific approach female diseases. His influence over students was narkable and he had the gift of transferring to them nething of his own enthusiasm.

n the last war he went to Rouen with No. 8 General spital and was in charge of the surgical division at iples. Later he became president of the Birmingham nch of the Joint Red Cross. Despite a private ctice which occupied more and more of his time he ved on the Radium Commission and was in close ch with professional organisation. He was president the Midland Obstetrical Society and a foundation nber of the Gynæcological Visiting Society. At the Club (named after his old ward at the General spital) he entertained all his old housemen and istrars at an annual festivity. His hospitality to tors also became a by-word. In his early days he a keen botanist and made a valuable collection of terflies; a zest for shooting remained unimpaired could seldom be gratified.

le was awarded a knighthood in 1937. In 1900 he ried Madge Rae, daughter of Walter Griffith of idsworth Wood, who survives him with a daughter, ing in ENSA, and two sons of whom the younger ouse-surgeon at Queen Elizabeth Hospital.

JOHN GILMOUR

O B E, M B, F R F P S GLASG, F R C S E, D P H

r. John Gilmour, who died on July 27 at the age of after a long illness, had made his name in Glasgow general practitioner before he was absorbed in Department of Health for Scotland. Having gradd in medicine with high commendation at Glasgow versity in 1891 he spent a year doing house appoints in the Western Infirmary, and afterwards at on. Then he joined his father, Dr. Adam Gilmour, actice at the little town of Duntocher, in Dunbarton, later succeeded him there, being affectionately vn as "Doctor John." In 1901 he moved to nuir, where he developed a large practice, including ebank. During the next twenty years he found time to take two Scottish fellowships and the DPH Camb. In 1921, when the regional medical service was initiated in Scotland, he was appointed to the then Board of Health, soon becoming a familiar figure throughout the South Western area, respected as a clinician and beloved as a friend and counsellor. In due course he became senior RMO in Glasgow,

Lafayette

has been so happy. Having retired in 1936 under the age-limit, on the outbreak of war he returned to the Department of Health in order to release younger colleagues for war service. He kept alive the regional service and later superintended the Clyde Basin experiment for war workers. His name appeared among the honours at the New Year. He was a member of the Home Office commission on workmen's compensation and miners' nystagmus. He leaves two daughters and a son, Dr. Alan Gilmour, who is in the public health service.

EDWARD PHILIP STIBBE

F R C S

Professor Stibbe, who had held for five years the chair of anatomy at King's College, London, died at his home in Gerrards Cross on July 21 at the age of 58 after a protracted illness. His passing has taken from the science of human anatomy a gifted exponent. He had a wide and varied experience which included medical and surgical practice, the tenure of the chair of anatomy in Johannesburg, service in the department of anatomy at University College, the London Hospital, and finally at King's College from 1935 onwards. This was reflected in the character of his lectures which were always interesting and wherever possible illustrated the application of his subject to clinical work. It is not surprising therefore that he won a considerable reputation as a teacher of undergraduate students. He had also the faculty of exercising an influence over students outside the lecture room

Lafayette

f anatomical books,
pology. His latest
Surgical Anatomy of
a Hunterian lecture
1936.

name will be most
ege it was to know
which kindliness and
his juniors he was
sy to listen to their difficulties or to help by advice and encouragement.

his health gradually failed, but
ie admiration of his friends for
aining courage as he fought the battle with the disease which claimed his body but never could subdue his spirit.

T. N.

Dr. JOHN POYNTZ RICE who died recently was one of the longest lived dispensary doctors in Ireland. Educated at Clongowes and Queen's College, Cork, he qualified in Edinburgh in 1883. He was appointed dispensary medical officer for Castleisland in 1889 and held this position for half a century till he retired in 1939 to spend his well-earned leisure on his favourite hobbies of gardening and farming.

Notes and News

University of Cambridge

On July 31 the following degrees were conferred:

MD.—L. J. Bendit, John Yudkin and Ronald Wylie-Smith.

MB, B Chir.—*H. W. Balme, *H. C. Gupta, *John Attenborough, *H. A. Fraser, *Harry Harris, *D. B. Beckwith Whitehouse, Gavin Hildick-Smith, O. L. S. Scott, *R. M. Forrester, *John Lister, *C. S. McKendrick, *P. A. G. Monro, *G. S. Udall, D. H. Makinson, *K. C. Robinson, *O. H. Wolff, *R. A. J. Baily, *D. R. Barnes, *John Davenport, *R. G. May, *R. A. P. Brown, *P. S. Smith, *T. R. Steen, *R. V. Stone, *J. D. Trethowan, E. H. Back, *R. A. D. Crawford, P. G. Mann, *D. J. Conway, *M. B. Devas, *Basil Haigh, *E. H. Hare, *A. S. Mason, *J. E. Oliver, *Ll. R. Twentyman, *W. D. Wylie, N. M. Mann, P. H. Schurr, *Peter Goodman, *D. L. Bridgewater, *M. R. Geake. *W. L. Calnan, *P. H. Mitchell, *W. J. L. Pain, *David Vérel, *I. S. Staddon, *Thomas Norman, C. H. Barnett, *P. H. Rogers*J. C. Lloyd, *R. F. Bates, *D. H. Drennan, *R. N. R. Grant, *J. K. Hinds, *P. F. Jones, *J. McEwen Potter, *E. L. Simons, *E. H. Williams, J. O. Laws, J. R. Robinson, *P. H. Huggill and *R. E. Loder.

* By proxy.

Royal Medical Benevolent Fund

The quarterly meeting of the management committee on July 30 had an encouraging report from the treasurer. How far the real need in these times for the fund to make larger grants to many of its applicants is to be met depends, however, on the extent to which the interest of the profession can be enlisted. The solicitors of the moribund Scottish Poor Law Medical Association had offered its credit balance to the fund on the understanding that any legitimate posthumous claims would be met. In cordially accepting this suggestion the executive commended the idea to other small medical bodies which may now have outlived their function. Discussion took place on the urgency of a home for aged beneficiaries. There is an increasing number of aged and lonely applicants whose chief need is a home. The late Dr. Holdsworth Davis had left his house in Bournemouth along with some money in the hope it might be used as a convalescent home, but restrictions on the property prevented and the house was sold. It would be a kindly act on the part of any who are in a position to do so to augment the Davis Fund so that a home for aged beneficiaries may be realised.

Chartered Society of Massage and Medical Gymnastics

The annual conference will be held on Friday and Saturday, Sept. 24 and 25, at BMA House. Mr. R. D. Langdale Kelham will give the opening lecture at 10.30 AM on the first day, when he will discuss the preparation of amputation stumps for limb-wearing from the point of view of the physiotherapist. Other speakers will include: Lieut.-Colonel St. J. D. Buxton, physiotherapy in the Middle East; Mr. R. W. Watson Jones rehabilitation, physiotherapy and orthopædics; Dr. J. L. Livingstone, work of a chest unit; and Dr. W. J. Craft, a demonstration of the bandaging of amputation stumps for limb-wearing. Brigadier F. D. Howitt who is to deliver the founders' lecture has chosen as his subject The Widening Horizon. Applications for tickets should be sent to the assistant secretary of the society, Tavistock House, London, W.C.1.

Medical Honours

The following awards to medical men have lately been announced:

CBE—Colonel Alexander Bremner, MC, MD EDIN., RAMC; Colonel D. G. Cheyne, OBE, MC, MD ABERD., RAMC; Colonel E. E. S. Wheatley, DFC, MRCS, RAMC.

MBE—Major J. Hay Arthur, MB ABERD., IMS; Major J. Hickey, RAMC; Major W. J. Young, IMS.

DSC—Surgeon Lieutenant D. M. Sheppard, MB EDIN., RNVR, and Surgeon Lieutenant A. S. Duncan, FRCSE, RNVR.

King Edward's Hospital Fund for London

Presiding over the 46th annual meeting on July 23, the Duke of Gloucester urged that our voluntary hospitals are part and parcel of the democratic structure of society and that upon their interaction with the official provision through the state and through the local authorities depends the power of the whole system to grow and adapt itself to changing conceptions of public need. On the medical side, he continued, we want to make sure that central supervision and coördination shall leave room for those whose ideas may not immediately commend themselves to those in authority. The president announced that arising from the memorandum on hospital diet, prepared by a subcommittee under the chairmanship of Sir Charlton Briscoe, a special committee was being set up under Prof. J. C. Drummond, D SC, to advise and help hospitals on this subject. With the help of three members of the nursing profession the distribution had also been considering the supervision of nurses' hea and had made some helpful suggestions. In presenting report Sir Edward Peacock, the treasurer, said that the to income for 1942 was over £330,000 and over £290,000 been distributed to hospitals, preliminary training schools nurses and for special services.

Brittle Needles.—We are informed that there are hypodermic needles on the market of German manuf and that these are liable to break in use, whereas this is in needles of British make; thus one British has had only one complaint of a needle breaking in eig years during which they have produced some 7½ needles.

Infectious Disease in England and Wales

WEEK ENDED JULY 31

Notifications.—The following cases of infectious di were notified during the week: smallpox, 0; sc fever, 1979; whooping-cough, 1896; diphtheria, paratyphoid, 10; typhoid, 13; measles (excl rubella), 2262; pneumonia (primary or influenzal 432; puerperal pyrexia, 163; cerebrospinal fever, poliomyelitis, 11; polio-encephalitis, 1; en lethargica, 1; dysentery, 99; ophthalmia neonat 78. No case of cholera, plague or typhus fever w notified during the week.

The number of civilian and service-sick in the Infectious Hosp of the London County Council on July 28 was 1608. During previous week the following cases were admitted: scarlet fe 190; diphtheria, 45; measles, 38; whooping-cough, 34.

Deaths.—In 126 great towns there were no de from enteric fever, 1 (0) from scarlet fever, 2 (0) fr measles, 10 (0) from whooping-cough, 6 (1) from theria, 61 (11) from diarrhœa and enteritis under years, and 9 (1) from influenza. The figures in theses are those for London itself.

Liverpool reported 8 deaths from diarrhœa: no other great t more than 4.

The number of stillbirths notified during the week 255 (corresponding to a rate of 37 per thousand births), including 26 in London.

Appointments

Baber, Margaret D., MD LOND., MRCP: resident physician at Helier County Hospital, Carshalton.

Heywood, C. P., MB MANC.: asst. VD MO for Co. Durham Northumberland and for Gateshead and Newcastle-on-Tyn

Lawrence, W. C., MB LOND.: asst. fracture and surgeon at the Coventry and Warwickshire Hospital.

Martin, A. Joyce, MRCS: temp. physician in psycholo medicine to St. John's Hospital, Lewisham.

Michaelis, Willy, MD FREIBURG: asst. radiologist at the Cov and Warwickshire Hospital.

Smith, V. Turner, MD MANC.: visiting asst. aural surgeon to Oldham Royal Infirmary.

Walker, R. J., MB CAMB.: examining factory surgeon for P teigne, Radnor.

Wareham, A. M., MB LOND., DOMS.: temp. asst. school MO Bedfordshire.

Births, Marriages and Deaths

BIRTHS

Adlington.—On July 30, at Gainsborough, the wife of Dr. Adlington—a daughter.

Alcock.—On July 31, at Terrick, Aylesbury, the wife of Squa Leader N. S. Alcock, MRCP—a daughter.

Esler.—On Aug. 2, at Caversham, the wife of Dr. A. R. Es a son.

Fenton.—On July 13, at Datchet, the wife of Major C. E. Fe RAMC, of Barking and Chelmsford—a son.

MARRIAGES

Ellis—Brannigan.—On July 3, in India, Hugh Lewis major RAMC, to Kathleen Jacqueline Brannigan, IANS.

Evans—Southon.—On Aug. 3, RAMC, of Bolton, to Edith Ann

Whitfield—Howe.—On June 12 Phillips Whitfield, captain RAMC, [illegible]

DEATHS

Aldous.—On Aug. 7, at Matfield, Kent, Robert Aldous, LRCPE.

Chetham-Strode.—On Aug. 7, in London, Reginald Strode, MB EDIN., aged 81.

Jehu.—On July 18, Thomas John Jehu, MD EDIN., FRSE, professor of geology in the University of Edinburgh, aged

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[illegible]

TREATMENT OF HEAD WOUNDS DUE TO MISSILES

ANALYSIS OF 500 CASES

P. B. ASCROFT, M B E, M S LOND, F R C S
MAJOR RAMC
(*From a Mobile Neurosurgical Unit*)

ГHE methods of treating missile wounds of the head
e presented have been gradually evolved as the result
nearly two years' experi e in the Middle East. In
of different types of case
At the base, when casual-
units cannot hope to deal
h more than a fraction of the cases. It follows that
military general surgeon must be prepared to deal
h wounds of all kinds. The functions of specialised
ts should be to deal with particularly difficult cases,
study intensively special kinds of injury and to make
ir results known.

BLE I—SEVERITY OF INJURY, MORTALITY AND DISPOSAL

	Mortality in whole series			Disposal of recovered patients *		
	Pati-ents	Deaths	Mortal-ity %	Pati-ents	Invalided on account of head wound†	To duty
p und only	85	0	0	80	1	76 (95%)
ture of ull— a intact	139	2	1 5	130	10	110 (85%)
a erced	292	44	15	226	93	124 (55%)
l ..	516	46	9	436	104	310 (71%)

d wound was concerned

able I shows the fate of 516 patients wounded in
le by missiles who came under the care of a mobile
rosurgical unit,* attached to a general hospital at the
. Patients arrived at all times from a few hours
nore than a week after injury. About three-fifths
undergone operation in forward areas, one-quarter
erwent primary operation after reaching the base,
one-eighth were not operated on at all. All patients
kept under observation till fit for duty; or, if unfit,
they were well enough t
mand (seldom less than 60
worked for a time in for
-hand experience of battle

are less
believed (table I).
proportion of men who return to duty, even after
re penetrating injuries, is much higher than was
cipated.

PRINCIPLES OF TREATMENT

he great lesson of this war is that battle
on the
But,
last
there has been a tendency to
without

of the brain and its coverings which influence
behaviour of head wounds and their treatment.

1. The scalp is richly supplied with blood; it has considerable resistance to infection, and heals well.
2. Spreading osteomyelitis of the skull is very rare (no instance in this series of more than 400 compound fractures).
3. The intact dura is a powerful barrier to the spread of infection, and the meninges as a whole have considerable powers of localising infection.
4. The tissue of the brain resists infection well, provided that the products of trauma and inflammation are not allowed to accumulate under pressure.
5. Continued exposure of the brain in an open wound is always harmful, and is always associated with some degree of infection.

It follows that some delay before operation is less harmful than might be supposed from experience with wounds elsewhere, since sepsis is seldom established very soon; and that closure of the wound is highly desirable as a means of protecting the exposed brain, and is often successful in accelerating healing. There are three further points to be considered:

6. Organic damage to the brain is irreparable; and even the gentlest surgical manipulations are damaging in some degree.
7. Surgical manipulations within the skull cannot be carried out effectively without preliminary X rays and special apparatus, especially an efficient mechanical sucker.
8. "Every scalp wound, no matter how trifling, is a potential penetrating wound of the skull" (Cushing in 1918).

FIRST-AID AND RESUSCITATION

First-aid.—Quickly assess the patient's general condition, noting (a) degree of shock; (b) depth of coma; (c) nature of the head wound; (d) other injuries (trunk, limbs). Cut away the hair around the wound, dust the wound liberally with sulphanilamide powder, and apply the first field dressing, securing it firmly with adhesive tape if the patient is confused and liable to tear off the dressing. Bleeding can be
adjusted firm dressing. If th
6 grammes of sulphadiazine give
3 g. intravenously. If the patient is unconscious he should be laid half prone, so that there is no danger of obstruction of the airway by the tongue, secretions or vomit; and he should be evacuated in that position. The Field Medical Card (AF W3118) and the Head Injury Card (AF W3118b) are filled in.

Resuscitation.—Shock is seldom severe in head wounds; when present it is due chiefly to loss of blood, and treatment is by blood-transfusion. Usually 2 to 4 pints are needed. The notion that blood-transfusion in head wounds may provoke dangerous intracranial bleeding by raising the blood-pressure is not borne

blood loss. In the field, the sedative of choice is morphia. It dulls the alarm and distress inevitably associated with injury in battle and allays violent restlessness which is commoner than in head injuries of civilian life; gr. ¼ is usually effective, injected intravenously. Further doses should be used sparingly.

EVACUATION

In mplete
operat hours
of dela time-
lag of have
not reached a base hospital under 48 hours, or more. Nevertheless, recent experience has shown that the results of primary operations at the base, carried out as late as 48 or 72 hours after injury, are at least as good as those of operations done in forward areas within 8 hours, and better than those done 9–16 hours after injury (table II).

We believe it is better not to operate in forward areas, provided that the patient can reach a fully-equipped base hospital within 18–72 hours of injury. That is not to say that there is any sake;
the sooner a always
provided th for a complete
operation and proper aftercare.

Over 100 of our cases, many of them severe, were evacuated by air, and they travelled well; there were no

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or M. Kremer, neurologist; Major R. W. Cope, anæsthetist; aptain G. B. Northcroft, assistant surgeon; and Major R. S. Hooper, who was assistant surgeon until leaving the unit in February, 1942.

TABLE II—RELATION OF TIME-LAG TO RATE OF HEALING AND MORTALITY

—	*(A) Operations in Forward Areas (273 cases)*					*(B) Primary Operation at Base (94 cases)*			
	0–8 hr.	9–16 hr.	17–36 hr.	37–72 hr.	72 hr. plus	17–36 hr.	37–48 hr.	49–72 hr.	4–7 days
Healed in 10 days (%) ..	35	28	14	17	..	75	71	59	68
Unhealed in 30 days (%) ..	35	51	47	51	71	6	24	23	23
Mortality *(dura penetrated only) ..	4 in 27	9 in 37	13 in 63	5 in 23	..	1 in 10	1 in 10	3 in 12	3 in 12

Total mortality for dural penetration = 17% in group A and 16% in group B.

* These figures refer to all patients reaching the base alive; they take no account of deaths in forward areas after operation.

deaths en route. Far more time was lost in getting casualties to the forward landing ground than in the journey thence to the base. The decision to evacuate or to hold should therefore be made at the first possible moment after the patient reaches a forward field ambulance or casualty clearing station. In our view, there are only three valid reasons for retaining head cases in forward areas:

1. Severe shock (evacuate as soon as the patient's condition permits).
2. Urgent surgery essential.
    - (*a*) Immediate threat to life by cerebral compression due to intracranial bleeding.
    - (*b*) Injuries of parts other than the head requiring immediate treatment.
3. No reasonable hope of reaching a special centre or the base in 48–72 hours.

The conflict between the chronometer and what might be termed "all modern conveniences" is by no means settled. Within certain limits "all modern conveniences" wins, even at the expense of up to 72 hours' delay. But what of the not uncommon case that cannot be evacuated for more than 3 days? Bold is the surgeon who deliberately withholds operation in a forward area, knowing that no surgery can be undertaken for 3 days or more; his whole training is against it. Bold also is he who, lacking the means, attempts a complete operation on a penetrating wound of the brain. As a compromise, it is suggested that when there is no reasonable prospect of a casualty reaching the base in 48–72 hours a modified operation be done on the following lines.

Open toilet of head wounds: an operation of expedience.—Preliminary treatment and preparation are carried out as described below in connexion with the formal operation. The scalp is shaved widely round the wound, which is then thoroughly cleaned. Obviously devitalised scalp is cut away (this does *not* mean formal excision) and all debris and dirt are removed. In the course of secondary operations, we have found that hairs and dirt, forced far beneath the scalp in the subaponeurotic layer, often escape notice. Fractures without a hole in the bone are left untouched. If there is a hole in the bone, it may be enlarged with nibbling forceps, just enough to allow removal of loose fragments of depressed bone or metal visible within the dural tear or in the surface of the brain. No other surgery is attempted. Bleeding is to be avoided, if possible; if disturbance of depressed fragments of bone seems to be about to provoke hæmorrhage, these should be left alone. The whole wound is carefully filled with sulphanilamide powder and left wide open; a protective dressing is applied securely † and the patient is evacuated as soon as possible to the base, where a complete operation should be carried out without delay (vide infra).

The chief objects of this "compromise operation" are to decontaminate as much of the wound as can be done with safety when full facilities are lacking; to provide as free drainage as possible from the deeper parts of the wound; and to allow thorough application of sulphanilamide to as much of the wound as possible. Simply to dump sulphanilamide powder on the untouched wound is
not much use. The powder usually lies on top of a
of blood-clot and debris and does not come into
with the wound itself.

EXAMINATION AND TREATMENT AT THE BASE

When a convoy of head cases arrived at the base
pital—we have had as many as 100 cases in 3 day
were dealt with as follows. While he still lay on
stretcher, each man's field cards were read, and
general condition, state of consciousness and any
fest palsies were noted. The wound was not un
at this stage, unless the dressing needed readju
Next, all patients, conscious or comatose, were
Not till that was done were they taken to the
operating-theatre.

The object of this brief clinical examination,
minutes or less, was threefold:

1. To assess the need for resuscitation. The only
emergency measure at this stage was to set up a
intravenous saline drips. Nearly all patients lacked
and some were dangerously dehydrated.
2. To establish a base-line by which to judge
the better or the worse, especially with regard to the
consciousness.
3. To decide the priority for operation, as judged by
severity and age of the wound, or by evidence from the
cards and personal observation of systemic de

On the rare occasions when clear evidence of
sive failure of consciousness was available, the
could unhesitatingly be marked as first for c
In most cases, however, there was little or no
history to be had from the field cards or
patient; moreover, it was found that immediate
examination was but a poor guide to the u
operation. It was for this reason that we came to
so much importance to immediate X-ray
as the principal means of speedily ascertaining the
tive urgency of most wounds.

The urgency of a wound depends largely on wh
the dura is penetrated or not; that of a
wound on the degree of damage to the brain
number of indriven fragments of bone. Study
X rays for fractures, for the presence and de
depressed or indriven bone, and for missiles
to foretell with considerable accuracy the state of
bone, dura and brain; and therefore (in conjunction
clinical findings) to gauge the urgency of the case.
X rays also provide essential information on the
graphy of wounds needs no emphasis. In restless
ents it may be necessary to give a small
injection of 'Pentothal.' Special views may be
to demonstrate fractures or indriven bone fra
certain regions where the bone is thin,
obscured by dense shadows—namely, in the low
poral, mastoid and low occipital regions, the
the vertex.

The nervous system should be examined in de
soon as opportunity offers, since focal signs, not
expected from the position of the wound and
apt to be overlooked, may indicate the path
indriven fragments of bone and metal, the
unnoticed wounds, or complications such as intra
hæmorrhage.

The importance of recording in writing the
consciousness when the patient is first seen and at
intervals cannot be overstressed. Changes in the
of consciousness are the most delicate index
progress of events inside the skull. Onset of drow
or deepening of coma is often the only sign of pr
intracranial bleeding, or the accumulation of
or pus under pressure. When many cases are to be
with and time is short, a nice judgment of priori
depends on recognition of changes in consc
It follows that it is never enough to say of a pati
he is "unconscious" or "conscious." The
loss of consciousness should be expressed in
or depression of important reflexes (corneal, p
light reflex, tendon jerks, plantar responses,
reflex, and response to pain or noise), or, in les
cases, according to the degree of confusion.

Examination of the head and neck is best
detail when the patient is on the operatin
anæsthetised, and with his head shaved.

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† A few turns of plaster bandage serve to secure the dressing and protect the head. A diagram of the wound, with the date and time of injury and operation, may be pencilled on the plaster casque.

The wound.—Apart from the usual observations to be nade in all wounds, certain points may escape notice. pparently trivial wounds may be of any depth, and the xternal appearance often gives no indication of the degree f damage to the brain. In wounds of the temporal egion the soft, pinkish temporal muscle may closely esemble pulped brain. When the wound is fresh there as no difficulty in distinguishing presenting brain matter
rom m
ped away;
out aft
firmer and
pears a
Recognis-
ble leak of cerebrospinal fluid from the wound is a grave ign; in our experience it has always been associated ith opening of the ventricular system.

There may, of course, be more than one wound. hrough-and-through wounds comprised 8% of penetrat- g wounds in this series. The exit wound is usually rger than the entrance and more jagged, the edges tend be everted, and, when the skull is pierced, spicules of one blown outwards are often visible. Two or more ounds caused by separate missiles were found often; many as three penetrating wounds have been seen in a nscious patient, each of them with indriven bone quiring operative removal, along with half a dozen her wounds not involving the brain. Spattering by eat numbers of small fragments of metal is quite mmon. The scalp may show one or more large cerations surrounded by numerous punctures; or a rge area may be "pin-cushioned," no wound being ore than a few millimetres in diameter. Occasionally attering is so intense as to cause extensive necrosis of e scalp.

Wounds of the face, especially of the orbit, often in-

y to miss a small penetrating wound of the eyeball.
wounded,
hould be
the com-
Loss of
ebrospinal fluid from the nose has the same grave ificance as in blunt injuries, for it indicates that there n open road for bacteria or air to the meninges and in. Cerebrospinal rhinorrhœa is seen most often in nds about the frontal sinuses. It is seldom recognis- for at least 24 hours after injury, as bleeding obscures Bleeding from the nose is usually due to wounds of forehead and upper part of the face; or occasionally he base of the skull, but this is rarely seen, since such nds are as a rule quickly fatal. Sometimes however ding from the nose is not related to the wound and is usually of little significance, being often due to the having been knocked down by blast and having ck his nose on the ground or on the brim of his steel net.

leeding from the ears is usually due to the effect of

wall of the auditory canal; externally the wounds invisible.

juries *of other parts of the body* may be overlooked, cially when the patient is unconscious. The whole should be examined. When the head wound is re minor wounds elsewhere may not be treated with respect they deserve, occasionally with disastrous ts. In two instances of penetrating wounds of the which had healed without incident, brain abscess loped, probably as a result of metastatic infection septic limb wounds, and one patient died. The side of the picture is commoner; just as a serious wound may divert attention from wounds of other , so a mangled limb may lead to an inconspicuous nore dangerous head wound being overlooked.

Lumbar puncture.—The value of lumbar puncture before primary operation is limited. There is one exception: if cerebral compression due to intracranial

measure the pressure of the lumbar spinal fluid. A pressure of more than 250 mm. usually means that immediate operation is necessary. Changes in the fluid distinguishable as due to infection and not to trauma alone (blood is always present in penetrating wounds) are seldom seen for 48 hours or more. Exceptionally, however, fulminating meningitis has been observed in wounds involving an air sinus and at the same time the ventricles or basal cisterns. After operation, on the other hand, lumbar puncture is of the highest diagnostic, therapeutic and prognostic value.

PREPARATION FOR OPERATION

Anæsthesia.—Local anæsthesia can be used less often than might be expected; many patients are too restless, while others have wounds elsewhere unsuitable for local anæsthesia. An excellent alternative, both in forward areas and at the base, is sodium pentothal. Anæsthesia is induced with about 0·5 g. as a 5% or 10% solution given with a syringe, and is maintained by the intravenous drip method using a 1% solution. Induction is swift and not unpleasant; post-anæsthetic retching and vomiting are rare. Breathing is quiet during operation, the brain does not bulge, the venous sinuses are not engorged, and conditions are as good as they can be for intracranial manipulations. The same quietness and lack of vascular engorgement is not always secured in a struggling patient under local anæsthesia.

In skilled hands pentothal is a safe anæsthetic for head cases. If used carelessly it is dangerous; reckless induction, an obstructed airway, in particular the slightest delay in dealing with impeded breathing, spell disaster. Major Cope, specialist in anæsthesia to the unit, was very careful not to overdose stuporous patients or those whose respiration was depressed. He gave the initial injection very slowly, all the time watching the effect on the breathing, in order to assess the patient's tolerance to the drug. As soon as the patient was unconscious, an airway was inserted and the oxygen tube attached in readiness. At this stage breathing sometimes became imperceptible. The patient was not allowed to become blue; oxygen was turned on immediately and the chest rhythmically compressed till proper breathing was re-established, usually in a minute or two. In no case was the face covered with drapes until breathing was seen to be easy. Once the patient had settled down after induction further respiratory embarrassment was unusual. When the face is concealed and the operation is in progress the surgeon must make himself responsible for warning the anæsthetist whenever the colour of the blood is not perfect.

Position on the operating-table.—Wounds of any part of the head can be dealt with satisfactorily on the

the venous sinuses.

Preparing the field of operation.—It is a painful and lengthy operation to shave the scalp of a conscious patient about inflamed, lacerated and often multiple wounds, when the hair is cemented in a matrix of blood

antiseptic. During the battle of El Alamein one surgical
team did 1
on brain
wounds, in
us that
time is save
Careless
placing of the patient on the table, niggardly shaving, and indifferent arrangement of the drapes all make for
slipshod or
of using m
chloride of
they adapt themselves to the contour of the skull more readily than dry ones and are less apt to slip. An over-

table of the Mayo type, arranged so as to keep the drapes off the face, allows the anæsthetist easy access to the nose and mouth.

Transfusion.—The hæmoglobin value in most large wounds of the head two or three days after injury is seldom more than 80% and often much lower. Further loss of blood at operation may cause a rapid fall of blood-pressure not easily restored to normal. It was the custom in such cases to start transfusion before operation, whether there were signs of shock or not.

THE OPERATION

Scalp.—Before the incision is made the X rays should again be inspected. When a fracture is seen its position should be carefully compared with that of the scalp wound. Should the missile have entered obliquely, especially where there is some depth of soft tissue over the bone, as in the temporal region, the fracture may lie at a distance from the breach in the scalp. A probe passed gently through the wound will usually determine the site of the fracture exactly, and the incision is planned accordingly.

The wound is excised as narrowly as possible and the incision extended so as to give comfortable access to any underlying lesion (fig. 1). Thus the shape of the incision will depend on the shape of the wound, the exposure required, and to some extent on the method of closure to be adopted. Wounds due to missiles are far more destructive than scalp wounds of civilian life, and more radical excision is necessary. There may be but a small external wound, but when it is opened up extensive loss of tissue of the deeper layers of the scalp may be found (fig. 2). The dermis is usually least damaged; beneath it the fibro-fatty layer is missing over a larger area, and disorganisation may extend well beyond the torn surface, as shown by infiltration with dark blood, failure to bleed when cut, and large droplets of free fat. The galea is destroyed to a similar and perhaps greater extent. It may be necessary in these wounds to sacrifice much apparently intact skin so that the edges of the final wound will be vertical and not bevelled inwards.

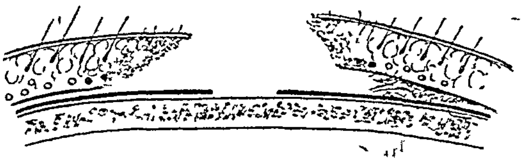
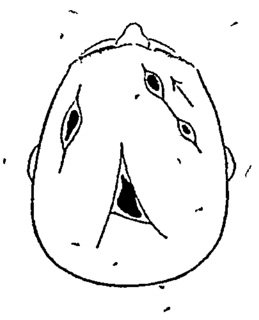


Fig. 2—Section of scalp wound to show undermining of subcutaneous layers. The aponeurotic layer, with the vascular plexus overlying it, often suffers most. The pericranium is usually affected less. Hair and other debris are often driven far in beneath the galea and pericranium.

Burning of the edges of the wound by high velocity missiles is not unusual, especially if a piece of metal of some size is arrested in the wound or beneath the scalp. The coagulated tissue should be excised. When the missile lodges in the scalp some distance away from the point of entry, the overlying patch of scalp may be cooked (fig. 3). The burned area, which should be excised, is easily recognised, providing the possibility is kept in mind; it looks dead and does not bleed if nicked with a tenotome. The bone beneath, though to the naked eye unchanged, may also be killed by the heat; such a case should be kept under observation lest sequestration occur.

When the scalp wound has been excised, careful search is made in the wound for hair, dirt, and sand, which are sometimes driven far into the subaponeurotic space. When there is more than one wound it is usually best to excise each separately, unless they are close together, when they may be excised in one piece. Through-and-through wounds caused by tangential missiles are best excised separately and the incisions joined so as to expose the whole track (fig. 1). Damaged temporal or nuchal muscle should be excised with the same thoroughness as muscle in other parts of the body. Destruction of the muscular layer is often much more extensive than in the scalp above and bone beneath. Small missiles causing no more than wee punctures in the scalp and temporal fascia have been found to destroy the muscle widely.

Violence that causes a depressed fracture almost ys tears the pericranium. Hence it may be said hat when the pericranium is intact, and in the absence



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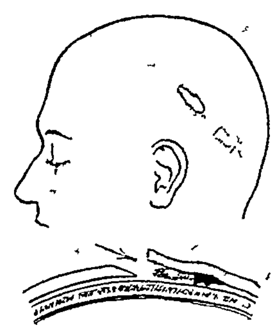

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Fig. 1—Incisions commonly used. In tangential through-and-through wounds (upper right in diagram) the whole track should be exposed

Fig. 3—Burn caused by a missile lodging beneath the scalp. The edges of the wound and the scalp are "cooked."

of other indications, it should not be incised nor the opened.

In spatter wounds confined to the scalp unnecessary, except in the rare instance of necrosis. An attempt may be made to pick out larger pieces of metal seen in X rays with small forceps inserted into the punctures, but the holes not be enlarged. The wounds are then powdered sulphanilamide and dressed. Sometimes a small requiring incision develops in connexion with one or fragments; the foreign body usually escapes when pus is released.

The bone.—The appearance of the fracture the size, momentum and direction of the missile; on part of the skull struck; and on the characters of individual skull, in particular the texture and of the bone and the relative thickness of the inner outer tables and the diploe. Since all these factors variable, all shapes and sizes of fracture may be tered, and all degrees of comminution. Except for fracture, treatment is substantially the same in excision of the fracture with the object of disc infection by removing all detached fragments of bone, of laying bare any underlying lesion of the dura for surgical attack. Experience suggests that exc should be conservative; bone should be removed as as the extent of the damage to the inner table, further. We have never employed the method of en bloc.

There is a tendency to remove far too much partly to obtain wide exposure, and partly with mistaken idea that wide local decompression is nec Many patients end up with large holes in the skull, cm. in diameter. Most bone defects caused by are small, and when the fracture is excised the need not as a rule exceed 3 cm. in diameter. A gap than 3 cm. usually fills with firm fibrous tissue and is little or no disability.

TREATMENT OF SPECIAL FRACTURES

The commoner kinds of fracture, with what is believed to be appropriate treatment, are described below.

Linear fracture.—Occasionally a narrow crack is seen in the X ray or at operation to underlie a scalp wound due to a missile. The mechanism of the fracture is obscure. Sometimes the pericranium is intact. Nothing should be done to the bone unless there is evidence of cerebral compression by clot, when a burr hole should be made to verify the diagnosis. It is common

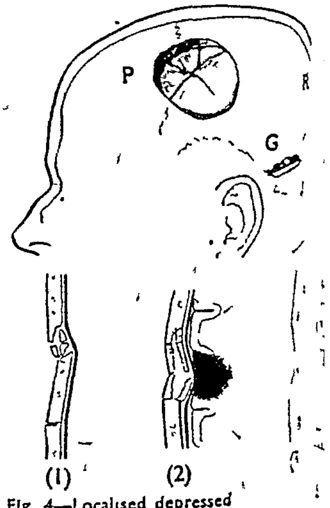

Fig. 4—Localised depressed rosette (R) and gutter (G) types table is affected more than the the dura is sometimes pierced by bone (2 and 3). The pond type (P), a wider area of skull is stove-in common, and the dura is seldom pie

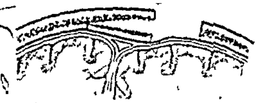

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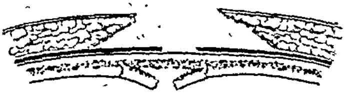
Fig. 5—Section through site of a depressed fracture that has been excised. One or two large flakes of inner table may be partly detached and depressed; To remove them requires sacrifice of much intact bone, and if the fracture overlies the longitudinal or lateral sinus serious bleeding may occur. If the wound is reasonably clean it may be best not to remove such fragments, but simply to lever them into position.



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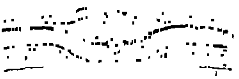

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Fig. 6—Depressed fracture affecting the inner table alone. Occasionally the dura is pierced.

Fig. 11—Bevelling the outer table and application of pressure pad to reduce dead-space.

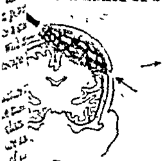
find fissures radiating from depressed fractures, but they not call for any modification in surgical treatment of the pression; not even when the fissures are wide and they are, with lacerations of wound itself.

loss of substance (no hole).— gs. 4 and 5). Such fractures ould always be explored. A burr hole is made at the ge of the fracture. The burr is to be applied gingerly, two reasons: the underlying inner table may be ssing, so that the bone may be much thinner than ticipated; and occasionally portions of skull at the ge of the depression may be loose, being enclosed by ear extensions from the fracture. All broken and pressed flakes of bone are removed, and the edge of the ect is trimmed with rongeurs as far as the limit of cture of the inner table.

b) *Pond, or stove-in fracture* (fig. 4). Sometimes, instead of the rosette, less abrupt depression of a wider area een, especially if the skull has been struck by a large, v-moving missile. Unlike the localised rosette type depressed fracture, the stove-in type should be eleed but not excised. A burr hole is made at the edge he fracture, as near as possible to the site of maximum nage and depression, oved and any small ressed plates are levere ear to be viable and there is no gross sepsis, are left itu.

) *Fracture of the inner table alone* (fig. 6). Fragments nner table may be depressed or even driven into the in without any depression, and sometimes without ectable damage to the outer table. As a rule, X rays w the depressed bone plainly. At operation the skull irst seems to be normal; but when closely examined he place where the pericranium is torn (and it almost riably is torn) one or two faint, irregular hair-line ks are found, indicating the site of damage. Occaally there is no trace of fracture, but faint bruising or allic staining may give a clue, as in the following

ase 1.—A lacerated wound in the left upper parietopital region had been excised in a forward area. It was ed in the notes that there was no sign of fracture. X rays n at the base showed a conspicuous group of depressed ments beneath the wound. One large flake was depressed 1. The wound was reopened and the pericranium was d to be torn, but a long search showed no trace of fracture. rominent was the fracture in the X rays that the mystified eon insisted on the identity of the X rays and of the pation whom he was operating being proved there and then. was found to be in order. The bone was again inspected and a faint bluish mark was noticed which might have marked the site of impact of the missile. A burr hole was made and three large detached flakes of inner table were found; one had pierced the dura. Reinspection of the X rays in the stereoscope showed that there was no way of telling that the outer table was not broken.



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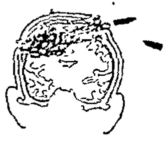

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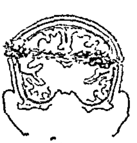

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7a—Tangential missile. A long furrow is cut in the bone, which is xtensively fragmented. There is considerable laceration of the brain.

7b—Tangential missile. Plates of bone are elevated and small fragments re deeply indriven. There is very severe damage to the brain.

8—Typical through-and-through wound. Entry and exit fractures re small. Injury to the brain is less extensive than in fig. 7, but because is deeper the injury may be even more dangerous.

Though scoring or pitting of the outer table may occasionally occur without fracture a burr hole should always be made adjacent to the mark if there is any reasonable doubt. Sometimes there is to be seen in operation notes the observation, "Fracture of the outer table only, therefore not trephined." For all practical ccur;

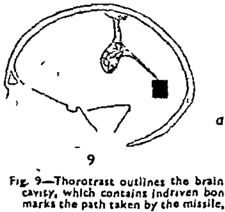
ufficient to groove or dent the bone may determine local sequestration, should the wound become septic.

Penetration of bone.—A localised depressed fracture of the skull without actual holing is not as a rule associated with penetration of the dura; but the presence of a hole in the bone, be it ever so small, nearly always means that the dura is pierced also. When the skull has been struck squarely the visible hole is usually little larger than the missile; indeed, the shadow of a missile seen radiologically to be lying in the brain may make one wonder how so large an object could have passed through so small a hole. When the impact is oblique the fracture is usually more extensive and irregular. As in depressed fractures, bone is nibbled away as far as the extent of the fracture of the inner table, beyond which the dural wound seldom extends.

Furrow fracture.—Tangential missiles when of some size may cause considerable destruction by cutting a long fur-

entrance and exit wounds in the scalp may give little indication of the extent of damage to the bone. The missile (e.g., rifle bullet) may traverse the surface part of the brain, make separate holes in the dura, and yet plough up the bone from end to end of the track. Good exposure in this kind of wound is obtained by joining the entry and exit wounds in the scalp when they have been excised.

Elevated fracture.—Two kinds are met with, the bursting and the slicing. The bursting kind is shown in fig. 7*b*. Should a missile of some size pass tangentially through



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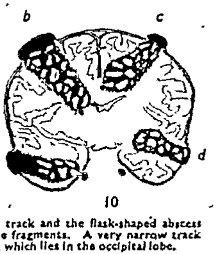

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Fig. 9—Thorotrast outlines the brain track and the flask-shaped abscess cavity, which contains indriven bone fragments. A very narrow track marks the path taken by the missile, which lies in the occipital lobe.

Fig. 10—Sources of deep bleeding in penetrating wounds. (*a*) Wound of temporal lobe involving the cortex on the inner surface; a spicule of bone impinges on the internal carotid artery. (*b*) Deep wound entering the lateral ventricle; the choroid plexus is in danger. (*c*) A common type of wound damaging branches of the anterior cerebral artery in the great longitudinal fissure. (*d*) Penetration of the temporal lobe; fragments of bone may have damaged the middle cerebral artery in the sylvian fissure.

the head not far from the surface (but deep enough not to furrow the bone) one or more large plates of bone are apt to be raised up between the points of entry and exit. Shattered fragments of bone about the track of the missile are removed, but large displaced plates often retain good vascular connexions and may be pushed back into position.

The slicing type of wound may be caused by a large flat piece of metal, the edge of which strikes the head a glancing blow and raises a kind of osteoplastic flap. Since these wounds are incised rather than lacerated they are less formidable than their appearance and size suggest. The elevated bone should not be removed; the whole flap should be accurately replaced without detaching it from the pericranium.

Foreign bodies in bone.—When metal is embedded in bone there is almost always an associated fracture involving the whole thickness of the skull, and removal of the metal is simply a step in excision of the fracture. Sometimes when metal is impacted in the outer table, the walls of the pit in which it lies may seem to be intact; nevertheless, the inner table is broken and depressed. In our experience it is always unwise to leave metallic fragments embedded in bone, even when the wound has healed before they are discovered, because of the frequent recrudescence of infection and osteomyelitis. The only exception is when operation is obviously difficult and dangerous, as in the rare instance of a missile lying in the base of the skull.

THE DURA

Dura intact.—An intact dura almost invariably prevents spread of infection to the brain. There is only one reason for opening it in a contaminated wound—immediate threat to life from subdural clot. Discoloration of the dura is not a reliable sign of the presence of clot; the clinical rather than the local condition should be the [illegible] ick of 2 or 3 mm. is enough to verify the [illegible]

[illegible] torn.—Nothing need be done to the dura except to cut away with scissors any tags. The opening should not be enlarged unless it is essential to gain a little more room—for example, in order to ease out [illegible] foreign body from the brain, or to [illegible]

Inconspicuous dural tear.—We have had cases in which notes from forward areas described the dura as intact and subsequent X rays have shown metal in the brain. A depressed flake of bone may cause a linear slit which will escape all but the closest scrutiny. These slits do not call for immediate treatment; like all dural tears, their importance lies in the fact that they are a breach in the main line of defence of the brain against infection. Early recognition of complications may depend on a knowledge of the state of the dura at primary operation, yet this is an item of information often omitted from the field card.

Sometimes the dura is separated from the bone around the fracture, and foreign bodies may lie concealed beneath the bone; in one case operated on in the forward area a thick lock of hair had escaped notice, and in another a piece of metal weighing 50 grammes.

THE BRAIN

In the typical penetrating wound a small area of skull, usually 1–3 cm. in diameter, is shattered and a shower of bone fragments is driven through the dura into the brain to a depth of a few centimetres. In about half the cases the missile also passes into the brain, usually well beyond the deepest bone fragments; often, however, the missile bounces off the skull. It is usually impossible to be certain by appearances at operation whether or not the missile is retained.

There is a striking relation between retention of bone fragments and development of brain abscess. The object of the operation on the brain is to remove as many indriven bone fragments as possible, to remove hopelessly damaged brain, blood, exudate, and foreign matter, such as hairs, fragments of scalp and bits of hat. Metallic foreign bodies are only removed if they lie alongside the bone debris; if, as is usually the case, the missile lies deeper it is best left well alone.

When the fracture has been excised and the dural efect exposed a conglomerate of pulped brain, blood-clot and bone fragments is usually seen to occupy the hol the dura, often forming a firm plug. Soft material sucked away from the surface and any visible fragments are lifted out with forceps. As soon as plug is loosened pent-up debris often begins to spontaneously, sometimes like tooth-paste, sometimes the form of a sudden gush of bloody fluid or clot, car with it numerous small flakes of bone. If the pa is conscious, he may assist in the evacuation of debris straining. With the help of the sucker (10 lb. p the track of the wound is cleared and its limits define Remaining bone fragments are picked out gently wi fine forceps. While it is of the utmost importance take out as many bone fragments as possible (their tion and number being checked by reference to X rays) more harm than good is done by too assiduo ferreting for small outlying spicules.

If the track is narrow it may be difficult to define follow, especially when the wound is no longer fresh, in the search for fragments of bone false passages be made in the brain. When the track is indistinct relative position of the bone defect and of indriven b as seen in the X rays is the best guide. The position deep-lying metal may be misleading, for should missile pass through the brain and strike the side of the skull it may be deflected back into the a tangent for some distance. On two occasions, also, have quite failed to appreciate the course of the track when the missile entered the body of the lat ventricle and rolled back into the occipital horn.

When a thin part of the skull is pierced, such as squamous temporal bone, or even when a very missile passes through a thicker part of the skull, prac ally no bone is driven into the brain. There is minute hole in the dura, cerebral damage is localised to the track of the missile, and, providing ing has been slight, almost no debris exudes. In cases the dural wound should not be enlarged nor track explored.

Deep tracks and through-and-through wounds (fig. When a missile of some size has passed deep into brain, or through it, it may not be possible to clear depths of the track because of the risk of starting and uncontrollable hæmorrhage, and the danger greatest when the ventricle is involved. In a traversing the brain, the exit and entry are dealt separately, the track being cleared from each end as safety will allow. The wound of entry calls for attention, since bone fragments are driven in; it curious fact, however, that at the exit wound also fragments may be found buried in the brain.

A cavity in the brain, sometimes of surprising size, persist when the wound track has been cleared, sometimes communicates with the lateral ve When the plug in the dural defect is loosened there be a prodigious gush of blood-stained watery flu which float shreds of disintegrated brain; or the ca may be full of tough blood-clot or dark liquid When the cavity is emptied all bone fragments usually found to have been removed.

Extensive superficial wounds are usually caused large missiles striking the head obliquely, or by tho high velocity, such as a rifle bullet, causing through-and-through wounds. Though formidable appearance and very destructive, such wounds are often fatal, or even crippling, than might be sup Considerable fungation of pulped brain is the When this is sucked away fragments of indriven readily removed, as they are usually large and not from the surface.

Metal in the brain.—Infection seldom arises round deeply embedded in the brain. Fragments of usually pass much deeper than infective debris and fragments, and thus are able to shed most of the taminating material (of less momentum) which drive in. The little that still clings is probably sterilised by the heat of the metal, and immedi behind it the track in the soft brain tends to seal Whether this explanation is the true one or not, ence has shown that deep, isolated metallic bodies seldom cause trouble and are best left alone. of our earliest cases illustrates strikingly the significance of metal and indriven bone as reg sepsis.

CASE 2.—This man was struck in the left parietal region near the vertex by a large missile which came to rest in the left occipital lobe. Operation of the "open toilet" type was done in the forward area. A small brain fungus developed. Ten days after injury pus discharged from the fungus, which shrank away, leaving an open track into the brain. A little thorotrast was run into the track and the head was X rayed (fig. 9). A flask-shaped abscess cavity containing several fragments of bone was outlined, and from the cavity a very narrow track led to the distant missile. As the patient was much improved since the abscess had drained spontaneously, it was thought best not to operate again. During the next 4 months the wound never healed, and he twice nearly died when the abscess flared up. By that time we had learned the true significance of indriven bone fragments. They were herefore removed (5 months after injury). The wound healed quickly. Six weeks later, when the cerebrospinal fluid had een normal for a month and air encephalography had shown o sign of a space-occupying lesion, he was invalided out of the ommand, the missile still in his occipital lobe. Had it lain longside the bone fragments it would, of course, have been emoved.

Bleeding from the brain wound.—Good hæmostasis is itally important in brain wounds. Without full quipment this is difficult to secure. We relied almost ntirely on electrocoagulation, and, for large vessels, on ushing's silver clips.

As soon as bone fragments lying in the dural defect are disturbed torn cortical vessels usually begin to bleed gain. They sometimes retract beneath the torn edge f the dura and may be difficult to secure unless the dural pening is enlarged a little. Once the superficial vessels ave been sealed the rest of the track can often be [illegible] urther bleeding, as white matter is [illegible]. But if the wound involves an [illegible] the under- or inner surface of the emisphere (fig. 10), [illegible] ay be provoked by [illegible] y, injudicious suction [illegible] ost often in wounds near the vertex, in which bone agments had pierced the brain and had lodged against e falx.

CLOSURE OF THE WOUND

When proper hæmostasis had been secured, the whole ound, including the brain, was liberally dusted with lphathiazole powder (not crushed tablets). When the ain track was narrow a thick cream of powder and line was injected under low pressure through a soft bber catheter inserted down the track. No untoward actions, of the kind described by Watt and Alexander,[1] ere observed. It should be added, however, that the ventricle was opened only a very small amount of lphathiazole was left in the brain wound.

Drainage.—In our view all wounds of the head due to ssiles should be drained. A small piece of soft corru-ted rubber (½ to 1 corrugation) is brought through a ab wound in the scalp, and so placed as to afford avity drainage when the patient is in bed. In pene-ting wounds the drain should reach to the edge of the ral defect; or when the wound is dirty well down into e brain track. In clean (i.e., surgical) wounds the ssibility of leak of cerebrospinal fluid may make inage inadvisable. Loss of fluid from missile wounds the calvarium, in our experience, always comes from e ventricle, never from the subarachnoid space. ntricular wounds are notoriously dangerous on count of grave risk of ventriculitis. If there is the ghtest rise of pressure in or about a wound communi-ing with the ventricle, infected or potentially infected date will pass into the ventricle. It is safer to direct flow to the exterior. It seems wise not to remove ins too soon; say, not before the fourth day, and if re is infection not for a week.

The dura.—It has been our practice from the first never close the dura in penetrating wounds due to missiles, l experience has not led us to alter it. In a series of cases cultures taken from the track in the brain at ration 30 hours to 7 days after injury were sterile in 1 y. Twelve per cent. of our patients who underwent mary operation at the base developed brain abscess. a small number of patients operated on in forward as a few hours after injury the surgeon had closed or had attempte [illegible] idence in this group [illegible].

When a wo [illegible] old—an [illegible] in the contaminated track; [illegible] e established and to spread [illegible] owards the ventricle. When [illegible] of the brain track is thought to be incomplete, the patient's safety depends on the establishment and maintenance of free outlet for exudate from the brain wound into the subaponeurotic space; and drainage of this space to the exterior is hardly less important.

The bone.—Plastic repair operations have no place in the acute stage.

When the scalp is united over a small defect in a thick skull a dead-space is left which may determine the onset of infection. The space can be reduced by bevelling the outer table (fig. 11). The scalp then sinks more easily [illegible] are best avoided in the [illegible] ey have often been [illegible] as in wounds in other [illegible] by excising damaged [illegible] possible by pressure dressings, and accumulation of blood and exudate prevented by drainage.

The scalp.—In the absence of gross sepsis the scalp wound should usually be closed. Experience and the weight of authority emphasise the importance of careful suture, especially in craniocerebral wounds, and attest how approximation of the galea aponeurotica is the key to a sound wound. Much, too, has been written on how to close the wound when there is loss of tissue, and many ingenious, and artistic incisions and flaps have been designed to this end. Most people, however, find that [illegible] that elusive little bit of slack. Too often the labour is in vain; either approximation is not achieved at all or closure is so insecure that the (enlarged) wound breaks down after a few days.

One thing is certain. It is worse than useless to drag [illegible] heavy mattress [illegible] (as we have seen [illegible] own. Though in a clean wound every effort should be made to close the scalp, especially when brain is [illegible] be said for wounds already [illegible] moderate degree may not int [illegible] closure has been easy and is without tension, but when there is tension the same degree of infection will often cause the wound to break down. Suture, if unwise and ill-performed, provokes the very state it is designed to prevent. There is no doubt that some wounds are better left open.

POSTOPERATIVE TREATMENT

Nursing the stuporous patient.—Patients who are fully conscious and able to look after themselves require no special nursing care. Those who are stuporous, unco-operative, restless or violent demand the utmost efforts of the nursing staff if they are to receive proper treatment; in fact, without skilled and devoted nursing, many of these patients will die. It is estimated that to manage a ward of 30 head cases, the majority of which are serious, 6 trained sisters and 12 medical orderlies are required, in addition to 8 well and willing patients to act as trolleymen and kitchen helpers.

Comatose patients, who lie like logs, soon develop pressure sores if not turned every few hours. Incontinence often accompanies coma or stupor and adds to the danger. The skin should be dried and powdered and the sheets changed whenever the bed is wet. Patients suffering from severe head wounds often scratch so violently that extensive excoriation of the skin is common; they often move their legs up and down continuously for hours at a time, wearing away the skin over the heels, ankles and knees. Finger-nails should therefore be cut short, and it is sometimes necessary to splint the limbs.

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[1] Watt, A. C. and Alexander, G. L. *Lancet*, 1942, i, 493

Fluid and food.—Most battle casualties, especially in hot weather, are more or less dehydrated, and the head injury is no exception. If the patient can swallow without choking (as tested by causing him to suck a swab wetted with sterile water) he should be given all he wants to drink. The severely wounded man, however, usually has neither the sense nor the energy to help himself, and it is not enough simply to leave a jug of water on his locker. He must be persuaded to drink. It is a good plan in a busy ward to tell off a reliable orderly to do nothing else but go round "forcing fluids."

When swallowing is impaired it is as well to set up an intravenous drip without delay ‡; if a patient is unconscious on arrival at the base he is certainly in urgent need of fluid. In all cases in which dehydration is to be feared a fluid-balance chart should be kept up to date. When swallowing is impaired for more than a day or two the patient begins to suffer from lack of food. This should be made good by giving a balanced ration through a nasal tube.

Sedation.—Those who have nursed a large number of head wounds find that something stronger than the familiar mild sedatives is sometimes essential; not for the relief of pain—severe or intractable pain is rare—but to control patients who are difficult to manage. It is imperative to curtail that persistent restlessness, occasionally amounting to mania, which makes the patient a menace to himself and others; to himself because he tears off his dressing, pulls out his intravenous drip needle, falls out of bed, and exhausts himself by his struggles; to others because he requires constant attendance, so straining further an already over-strained nursing staff. Intravenous paraldehyde has proved an acceptable alternative to morphia; 3 c.cm. of the pure drug as supplied by the dispensary is injected intravenously very slowly. This causes the patient to cough violently, but he quickly falls asleep. Quiet sleep can be maintained by adding to the intravenous drip fluid enough paraldehyde to maintain a flow equivalent to 1 c.cm. of the pure drug in 1 to 3 hours, according to requirements.

Return to activity.—If all goes well return to health is rapid after a head wound. Headache is shortlived and the patient soon wants to be up. The period of clouding of consciousness or stupor often seen in severe injuries may persist for several days; then it disappears rather suddenly as a rule, and within a day or two the patient is found sitting up in bed, chatting to his mates, reading the paper, and taking part in the normal life of the ward.

In accordance with the policy of minimising to the patient the significance of injuries of the brain, it has been the practice in this unit to allow patients to resume their normal activities as soon as they feel well enough. Men are allowed out of bed, if they feel up to it, within a few days of injury, provided they are free from fever. They are encouraged to help in the ward, to go to concerts or out on pass into the town. Good rather than harm comes of this policy, providing reasonable precautions are taken to curb the enthusiasm of the euphoric and protect the partly disabled. (Hemianopics and aphasics should not leave the hospital unaccompanied; though an aphasic accompanied by a hemianopic makes a safe combination!) Lack of desire to follow the normal pursuits of the convalescent patient usually means the presence of some complication such as brain abscess. If no sign of intracranial mischief is discovered, the patient should be actively encouraged to get up and about.

In a busy ward, there are plenty of useful jobs for convalescent patients to do, jobs that provide physical exercise and opportunity to show initiative, and, as the men themselves can see at once, that are well worth doing. A good sister will soon have convalescent patients helping in the kitchen, ferrying meals and cleaning the ward. She will make one man responsible for collecting linen, appoint another to collect stores, a third and fourth to help lift patients, four more as trolleymen to take patients to and from the theatre and X-ray department. This is useful and responsible work, in fact ideal occupational therapy, more satisfying in this respect than wield a bodkin or a fret-saw. Moreover, activity amo convalescent head-injury patients encourages the n patients, who may be alarmed and despondent at t thought that their brain has been injured.

My thanks are due to Colonel H. D. F. Brand, officer co manding No. 15 (Scottish) general hospital. I am indebted Major-General D. C. Monro, urge Middle East Forces, and to W. Ogilvie, for their constant help. Ma J. Revans, without whose efforts the work would have b seriously curtailed; and to the numerous medical officers many scattered units for their willing cooperation. Bu Douglas McAlpine, consulting neurologist, spared no effort improve the work of the unit. His personal interest a active participation in the clinical work were a inspiration. It is a special pleasure to thank Brigadier H Cairns, consulting neurosurgeon to the Army, for gener help in the preparation of this paper; without his fore and guidance it could not have been written.

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‡ It is a good plan to set up an intravenous drip in all severe and difficult cases at the first opportunity; chemotherapeutic agents, sedatives, &c., may then be conveniently given along with fluids.

TOXICITY OF TANNIC ACID

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THIS paper describes experiments carried out at request of the Burns Sub-Committee, War Wo Committee, Medical Research Council, on the pr of the possible toxic effects resulting from the absorpti of tannic acid from a burned surface. The studies w suggested by Lieut.-Colonel W. C. Wilson, RAMC, unpublished reports to the War Office and the Me Research Council from an Army medical research in the Middle East. In experiments made before he Britain, Wilson had found that tannic acid was toxic animals; and in a memorandum submitted to the subcommittee in May, 1942, he referred to the p that absorption of tannic acid might be a cause of in human cases of burns so treated. His experience the Middle East, though admittedly inconclusive, indicated that toxæmia was more common and in burned patients treated with tannic acid, and described definite pathological changes in the livers patients who had died in the toxæmic stage after acid treatment. His earlier experiments in animals shown that injury to the liver was the most obv abnormal feature of mice killed by injections of ta acid or sodium tannate.

Wells and his colleagues (1942) reported a series of p mortem findings in patients dying during the first few after severe burns. All had been treated with liberal of tannic acid and all showed a characteristic picture of l necrosis. These workers also produced a similar lesion in livers of rats by subcutaneous injections of tannic a They go so far as to suggest that specific changes in the l have been reported in fatal cases of burns only since the in duction of tannic acid by Davidson (1925). Patholo changes in the liver after burns had, however, been descr earlier, in both man and animals (Bardeen 1897, Pfeiffer and Olbrycht 1924), but it is true that a more specific l lesion—a hæmorrhagic central necrosis with a polym infiltration—has been reported in human cases only since (Wilson 1942). Descriptions of these lesions are found in reports of Wilson and his colleagues (1938), McClure (19 Belt (1939), Brins and Hartmann (1941) and Wells and colleagues (1942). It is noteworthy that all the cases r to in these reports, including the animals of Brins and H mann, had been treated with some type of tannic acid prep tion and that Allen and Koch (1942), who do not use t acid, have not, in a considerable series of autopsies, seen extensive liver changes described by Wilson and his assoc Such evidence is clearly suggestive, and in view of the w spread use of tannic acid in the treatment of burns, fur investigation seemed desirable.

At this point it is worth recording recent experimen Mueller (1942) who has shown that tannic acid (124 mg given by mouth to rats produces toxic symptoms. I ished growth as a result of feeding tannic acid to rats chicks has also been recorded (Lease and Mitchell Ringrose and Morgan 1940).

TABLE I—TOXICITY OF TANNIC ACID AND SODIUM TANNATE AFTER INTRAVENOUS INJECTION INTO MICE

Dose (mg.)	Animals	Dead in 48 hr.	Comment
Tannic acid			
5	2	2	Died instantly.
2·5	10	10	" "
1·2	9	8	" "
0·6	6	1	2 given 2nd injection of 0·6 mg.; both dead in a further 24 hr.
0·3	4	0	2 given 2nd injection of 0·3 mg.; both dead in a further 24 hr.
Sodium tannate			
1·2	6	4	
0·6	3	0	[illegible]
0·3	3	0	[illegible]

Impaired liver function has also been reported after burns Boyce and McFetridge 1938b, Wolff et al. 1940, Thompson and Wilkinson 1940, and Abbott and Holden 1942). Here, however, it may be difficult to differentiate the effect of tannic acid from that of the anæsthetic which is known to depress the function of the liver (Boyce and McFetridge 1938a and Thompson and Wilkinson 1940).

In the present study the experimental work of Wilson on the toxicity of tannic acid has been confirmed. From the outset it became clear, however, that the degree of toxicity depended to a great extent upon the method of administration. Thus 20 mg. given intravenously killed a guineapig within a few minutes, whereas 1·6 g. intramuscularly failed to kill guineapigs within 24 hours. It was therefore obviously essential to determine whether tannic acid was absorbed from a freshly burnt skin surface.

The difficulty of producing in an experimental animal a suitable surface for the application of tannic acid probably explains why this question has not been previously [illegible] ed (Leach, Peters [illegible] possible to produce [illegible] burn is produced by [illegible] –70° C for 1 minute, the epidermis becomes detached and can be wiped away leaving exposed the raw moist dermis which may readily be tanned.

In an attempt to show whether or not tannic acid was absorbed, use was made of 3 staining reactions described below. Tissues near the burned area, œdema fluid and internal organs were examined in this way.

TABLE II—TOXICITY OF TANNIC ACID AND SODIUM TANNATE AFTER INTRAVENOUS INJECTION INTO GUINEAPIGS

Dose (mg.)	Result	Comment
Tannic acid		
200	Died instantly	..
20	Died in 10 min.	..
20	Died in 10 min.	..
20	Died in 10 min.	..
20	Died in 24 hr.	..
10	Survived	Killed 24 hr.
10	Survived	Survived further dose (5 mg.) 24 hr.
5	Survived	Survived further dose (10 mg.) 24 hr.
Sodium tannate		
40	Died in 10 min.	..
20	Died in 24 hr.	..
20	Survived	Killed 14 hr.
20	Survived	Survived 24 hr. after 2 further doses (20 mg.) 24-hrly.
20	Survived	Survived 24 hr. after 2 further doses (20 mg.) 24-hrly.

Experiments

Mice (20–25 g.), rats (150–200 g.) and guineapigs (00–800 g.) were used in these experiments.

Method of burning.—Burns suitable for the application of tannic acid were produced by a method similar to that described by Leach and his colleagues (1942). A 250 ml. beaker filled with water at 70–80° C. was firmly applied to the skin of a clipped unæsthetised guineapig for ½ minute. The burned area was then denuded of epithelium by rubbing it with moist cotton-wool. When tannic acid was used a 20% solution was applied with wool pledgets 3 times within the 2 hours immediately after the burn. By the end of 24 hours a hard dry black scab had formed. In other animals left untreated after removal of the epithelium a firm brown scab formed also within 24 hours.

Detection of tannic acid.—Small pieces of tissue (skin, muscle, liver, kidney, lung) and cotton-wool soaked in œdema fluid were dropped into solutions of staining reagents in watch-glasses. The following solutions were used:—

Ferrous sulphate 20%. A similar method was used by Wilson and has been employed in the past for the detection of tannic acid in plants (Gardiner 1884).

Vanadium chloride 1%. This reagent, which like iron produces a dark coloration in the presence of tannic acid, has also been used to detect tannic acid in plant tissue (Cavazza 1908). Tests (a) and (b) were read after 1 hour.

Nessler's reagent. In the presence of tannic acid this reagent produces a dark coloration (Moore 1890). In contrast to the preceding reactions the colour is produced rapidly and readings were taken after 5 minutes, the excess Nessler's reagent having first been washed away with distilled water.

The three methods gave similar results and their sensitivity is approximately the same. It was possible to detect tannic acid in a 1 : 100,000 dilution of a 20% solution (2 parts per million). Solutions of many other readily available metallic salts were tried but none was so sensitive. These reactions are also given by some of the breakdown products of tannic acid (e.g., gallic acid).

TABLE III—MORTALITY AFTER INTRAMUSCULAR INJECTION OF TANNIC ACID AND SODIUM TANNATE INTO RATS AND MICE

Dose (mg.)	Preparation	Animals	Dead in 24 hr.	Comment
Rats				
400	Tannic acid	12	0	4 killed 24 hr. to 8 days later. Rest survived 14 days.
400	Sodium tannate	10	5	3 survivors killed 24 hr. to 8 days later. Rest survived 14 days.
Mice				
100	Tannic acid	4	1	Rest killed at 24 hr.
100	Sodium tannate	4	2	Rest killed at 24 hr.

Results

(A) TOXICITY OF TANNIC ACID AND SODIUM TANNATE

Tannic acid is a poorly characterised substance, and therefore the toxicity of different commercial samples may vary to some extent. The preparation used in [illegible] by British Drug [illegible] II give a summary of the results of injecting solutions of tannic acid and sodium tannate into the tail-veins of mice and the ear-veins of guineapigs. The total volume of fluid injected was 0·25 ml. The animals were observed for 48 hours after injection [illegible] period. From [illegible] acid is almost [illegible] fatal dose is ap[illegible] Sodium tannate appeared to be equally toxic for mice [illegible] as soon apparent that [illegible] ger doses if these were given intramuscularly. This may be due to the fact that both tannic acid and sodium tannate being irritants give rise to an acute inflammatory reaction which will delay their absorption. In this connexion, it is interesting to note that sodium tannate appeared to be more toxic for rats, presumably because it is less irritating and therefore more easily absorbed (table III). Rats receiving doses of 400 mg. tannic acid survived. Some mice survived 100 times the fatal intravenous dose of tannic [illegible] and sodium tannate, and 3 guineapigs were alive [illegible] 24 hours after receiving 80 times the fatal int[illegible] dose of these substances.

(B) TANNIC ACID ON A FRESHLY BUR[illegible]

Guineapigs were burned as previou[illegible] most suitable burn appeared to be [illegible] quarter of the body surface and situated on the belly of the animal; from these burns substances giving the tannic acid reaction were absorbed more readily (see section C) than from burns on the back of the animal. Burns of a third or more of the body-surface often proved fatal within the first 24 hours.

Four groups of guineapigs were burned in this way. One group had the lesions tanned by 3 applications of 20% tannic acid within the 2 hours immediately following the burn; one was tanned by 6 applications of 5% tannic acid within 2 hours of burning and 3 applications on each of the following 2 days; one had normal saline applied as often as the 5% tannic acid and one received no treatment. The higher mortality figures for the animals treated with tannic acid is of interest (table IV), but more significant was the difference in general condition of surviving animals. Animals treated with tannic acid appeared worse, and lost, on the average, nearly twice as much weight as untreated animals during the 7 days succeeding the burn (table V and figure). This difference is statistically significant ($t = 2{\cdot}88$; for $P = 0{\cdot}01$, $t = 2{\cdot}78$) and all the more so, when it is borne in mind that table V and the figure do not include animals which died within the first 7 days of the experiment, more of which were in the treated than in the untreated group. Thus the application of tannic acid to burned guineapigs may affect adversely both the mortality-rate and the general condition of the surviving animals. It must be stressed, however, that the area of body surface burned is important; with a larger area the animals die no matter what local application is made to the burn and with a smaller area the above results cannot be obtained.

(C) TANNIC-STAINING SUBSTANCES IN THE TISSUES

Tannic acid was tested for as described above.

After intravenous injection.—After the injection of fatal doses of tannic acid or sodium tannate the livers of mice always gave a positive reaction. It was also possible to obtain the tannic acid reaction in the livers of those animals killed 24–48 hours after the injection of a non-fatal dose. On the other hand, in guineapigs, while it was possible to obtain the reaction in the liver, kidney, and lungs after a large fatal dose (200 mg.), positive findings were less constant after small fatal doses (20 mg.). Non-fatal doses gave no reaction at all. Sodium tannate in doses of 20 and 40 mg. was readily recognisable in the tissues. This confirms the observation of Wilson that positive staining reactions are more readily detectable after injections of sodium tannate than after equivalent doses of tannic acid.

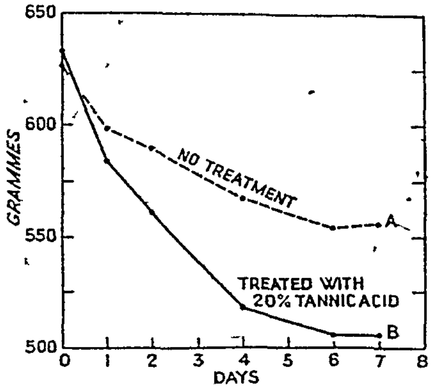
After intramuscular injections of tannic acid and sodium tannate positive reactions were obtained with the liver (the only organ tested) of rats and with the liver, kidney and lungs of mice. There was no constant difference between the animals receiving tannic acid and those receiving sodium tannate. In addition, little difference was found between those animals that survived th injection and were killed later, and those that died withi 24 hours of receiving the injection. On the other han there was no tannic acid detectable in the tissues o guineapigs that received 1·6 g. tannic acid or sodiu tannate and were killed 24 hours later.

After application of tannic acid to burned surface.—Because of the significance of absorption of tannic aci from burned areas the results of these investigations a reported in greater detail (table VI). When a 20 solution of tannic acid was applied to a large burn (a thir

TABLE V—CHANGES IN WEIGHT OF GUINEAPIGS BURNED UNDER ETHER ANÆSTHESIA (A QUARTER OF BODY SURFACE)

Dressing applied	Animals	Av init. weight (g.)	Av. final weight (g.)	Mean change in weight (g.)	SE of mean
None	14	626	556	– 70	± 12
TA 20% 3 times in first 2 hr. ..	14	632	506	– 126	± 15

SE = standard error.



Mean change in weight of guineapigs burned under ether anæsthesia (¼ body-surface). A: no treatment. The fall in weight of animals after experimental burning had previously been observed by Peters in a private communication. B: with 3 applications of 20% tannic acid after burning.

TABLE IV—MORTALITY OF GUINEAPIGS BURNED (A QUARTER O BODY SURFACE) UNDER ETHER ANÆSTHESIA

Dressing applied	Animals	Dead in 7 days	Survived	Mortalit %
None	18	1	17	5 5
Normal saline, 6 times in first 2 hr., then 3 times on each of 2 subsequent days	12	0	12	0
TA 20%, 3 times in first 2 hr.	18	4	14	22
TA 5%, as normal saline above	12	2	10	17

Mortality without tannic acid (TA) = 3 5%
Mortality with tannic acid = 20%

TABLE VI—STAINING TESTS FOR TANNIC ACID IN TISSUES O GUINEAPIGS BURNED AND TREATED WITH 3 APPLICA OF 20% TANNIC ACID IN THE 2 HOURS AFTER BURNING.

The plus signs give some indication of the strength of th reaction.

Area of body surface burned	Site	Died or killed	Treatment	TANNIC ACID (TA)						
				Liver	Lungs	Kidney	Ant. muscle	Post. muscle	Skin	Œdema fluid
⅗	Back & belly	D. 24 hr.	TA	+	+	+	+++	++	+++	–
⅗	,,	,,	,,	±	+	+	++	+	+++	–
⅗	,,	,,	Nil	0	0	0	0	0	0	–
⅓	,,	,,	TA	+	+	+	–	+	+++	–
⅓	,,	,,	,,	±	+	+	+++	++	+++	–
⅓	,,	,,	,,	+	+	+	+++	++	+++	–
⅓	,,	,,	Nil	0	0	0	0	0	0	–
¼	Back	K. 24 hr.	TA	0	0	0	–	±	+++	–
¼	,,	,,	Nil	0	0	0	–	0	0	–
¼	Belly	,,	TA	0	0	0	+++	0	+++	–
¼	,,	,,	,,	0	0	0	++	0	+++	–
¼	,,	,,	Nil	0	0	0	0	–	0	–
¼	,,	,,	,,	0	0	0	0	–	0	–
¼	,,	D. 4th day	TA	0	0	0	+++	0	+++	–
¼	,,	K. 4th day	,,	0	0	0	+++	0	+++	–
¼	,,	,,	Nil	0	0	0	0	0	0	–
¼	,,	D. 6th day	TA	0	0	0	+++	0	+++	–
¼	,,	,,	Nil	0	0	0	0	0	0	–
¼	,,	K. 1 wk.	TA	0	0	0	+++	0	+++	++
¼	,,	,,	,,	0	±	0	+++	0	+++	++
¼	,,	,,	Nil	0	0	0	0	0	0	0
¼	,,	K. 2 wk.	TA	0	0	0	++	0	+++	+
¼	,,	,,	,,	0	±	0	+	0	+++	+
¼	,,	,,	Nil	0	0	0	0	0	0	0
⅛	Back	K. 24 hr.	TA	0	0	±	–	++	+++	–
⅛	,,	,,	,,	0	+	±	–	++	+++	–

o two-thirds of the body surface) from which the animal uccumbed within 24 hours, a positive tannic acid reaction *ould be obtained with the liver, lungs, kidney and muscle* [illegible]; and of course, from the tanned [illegible] burnt but not tanned gave no [illegible]

When the burns were smaller (a sixth to a quarter of he body surface) there was normally no staining of the nternal organs but always staining of the muscles deep o the burn. This staining was greater when the burn as on the ventral rather than the dorsal surface of the runk. A factor that might have accounted for this was he slower rate of drying of the coagulum on the belly all. At the same time there was a considerable accumution of œdema fluid between the skin and muscle. This ad sometimes clotted and on occasions attained to a hickness *of 1 cm. When tested this fluid invariably gave* ositive reactions for tannic acid. Fluid from untreated urns was always negative.

It is clear, therefore, that some substance giving the nnic acid reaction can penetrate burned skin to reach e *underlying muscle and intervening œdema fluid, and*

ABLE VII—HISTOLOGICAL APPEARANCE OF LIVER OF MICE AFTER INTRAVENOUS INJECTION OF TANNIC ACID

Dose mg.	Died or killed	Report
5	D. in 24 hr.	Ex [illegible]
·25	D. in 24 hr.	[illegible]
6	K. at 48 hr.	M [illegible]
6	K. at 5 days	[illegible] actively. [illegible] necrosis; [illegible] nd macro- [illegible]

ne, at least, is absorbed. The fact that it was not ected in the organs of all guineapigs that died after ving had tannic acid applied to the burn does not exde *the possibility that the tannic acid exerted a toxic* ion. As has already been noted, none could be ected in guineapigs that had received a fatal intraous injection (20 mg.). Similarly, there is no reason exclude a possible part played by absorbed tannic acid contributing *to the greater weight-loss observed* with tanned animals.

(D) HISTOLOGICAL CHANGES IN LIVER

ections of liver tissue were prepared from many of the mals, an [illegible] *to Prof. G. R.* neron for [illegible] (tables VII, VIII, IX) and [illegible]

fter intravenous injection of tannic acid into mice (table "severe liver damage is seen in all cases—centrolobular ming confluent." *After intramuscular injection of* [illegible] (table VIII) "there is [illegible] 1 day, but not there- [illegible] of tannic acid and um tannate to guineapigs (table VIII) "there is marked damage with tannic acid but less marked with sodium ate (but only one animal in each case, so no general lusion can be made)." After burning (table IX), "there doubt that the livers of the tanned animals of group A [illegible] group B [illegible] tual necrosis, but the other has a normal liver. It seems when the animals are allowed to live longer after tanning iver changes are somewhat more severe, though, of course, *would be a limit to this period, for regeneration soon* m."

is thus seen that after intravenous injection of tannic there is definite liver necrosis. After intramuscular injection the damage is less severe but quite definite. After application of tannic acid to a burned surface the extent of damage though slight, is definitely more severe than that seen in the controls that were burned only.

TABLE VIII—HISTOLOGICAL APPEARANCE OF LIVER AFTER INTRAMUSCULAR INJECTION OF TANNIC ACID AND SODIUM TANNATE

Dose (mg.)	Preparation	Dead or killed	Report
Rats			
400	TA	K. at 24 hr.	Much cloudy swelling and congestion only.
400	TA	K. at 4 days	Normal; much glycogen.
400	Sod. tannate	K. at 24 hr.	Cloudy swelling only.
400	Sod. tannate	K. at 4 days	Normal.
Guinea pigs			
1600	TA	K. at 24 hr.	[illegible]
1600	Sod. tannate	K. at 24 hr.	Cloudy swelling + + +. Congestion + + +. Some areas of necrosis. Very little glycogen.

Discussion

[illegible] burned surface. That the application of tannic acid to such a burned surface is harmful is shown by the increased mortality and weight-loss that follows the application (section B). The histological appearance of livers after injection or application of tannic acid make it probable that some of the ill effects following tannic acid administration arise from liver damage.

This experimental evidence, taken in conjunction with the previously noted fact that severe liver necrosis in human cases of burns has only been reported since the [illegible] results have been obtained without the use of tannic acid (Mason 1941, Allen and Koch 1942, Siler 1942, and Siler and Reid 1942).

TABLE IX—HISTOLOGICAL APPEARANCE OF LIVERS OF GUINEAPIGS BURNED UNDER ETHER ANÆSTHESIA (¼ QUARTER OF BODY SURFACE)

When killed	No treatment	Treated with [illegible] applications [illegible] tannic acid within [illegible] of burning
After 3 days	1. Mild centrilob. [illegible] degen. and fatty [illegible] 2. Mod. centrilob. [illegible] degen. [illegible] 3. Sl. centrilob. [illegible] degen. [illegible]	1. Considerable [illegible] 2. Marked [illegible] 3. As 2.
After 2 days	1. [illegible] 2. As 2. 3. Sl. [illegible] necrosis [illegible]	1. [illegible]
After 1 day	1. Sl. cloudy swelling and [illegible] glycogen [illegible] 2. Normal. 3. As 1.	[illegible]

[illegible]

COMBINED ACTION OF ANTITOXIN AND LOCAL CHEMOTHERAPY ON *CL. WELCHII* INFECTION IN MICE *

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IN earlier communications (McIntosh and Selbie 1941, 1942, 1943) it has been shown that chemotherapeutic substances, particularly penicillin and proflavine, are of considerable value in preventing the development of experimental gas-gangrene infection in mice when these remedies are applied locally in the early stages of the disease. In the later stages of the infection, however, when the organisms have invaded the blood-stream, the local application of these drugs is apparently of much less value. This paper describes experiments designed to test whether any advantage could be gained by supplementing antitoxin with *local* chemotherapy especially in the later stages of the disease.

Details of the technique used in these experiments were given in the earlier communications. The infecting dose of washed *Cl. welchii* (strain B.S.I. No. 186) is standardised to contain at least 100 lethal doses and is suspended in 2·5% calcium chloride immediately before intramuscular injection. Local chemotherapy is administered by injecting a solution of the drug at the site of infection in the right thigh. Antitoxin is given by injecting the required dose in 0·2 c.cm. of saline subcutaneously in the right flank.

Preliminary experiments confirmed the finding of other workers that antitoxin, injected at the time of infection, protects all mice infected with fluid cultures of *Cl. welchii.* The value of antitoxin in this type of infection is due to the neutralisation of the preformed toxin in the fluid culture which would otherwise produce the lowering of oxygen tension necessary for the initiation of gas-gangrene infection. In the experimental technique described here, however, the infection is initiated by the presence of calcium chloride and is thus more comparable to conditions in man. In this type of infection antitoxin is not so consistently effective, as is shown in table I, where the value of treatment is assessed by calculating the average number of whole days survived, obtained by dividing the total number of whole days survived in each group of mice by the number of mice in the group; the mortality for only 3 days is considered since the great majority of mice surviving this period survive indefinitely. From the results in table I it is evident that antitoxin alone is too irregular in its action to be a satisfactory prophylactic agent against this type of experimental infection where the initiation of infection is not determined by the presence of preformed toxin.

TABLE I—IRREGULAR EFFECT OF ANTITOXIN ON MICE INFECTED WITH WASHED *Cl. welchii* AND CALCIUM CHLORIDE

Dose of antitoxin (units)	No. of expts.	No. of mice	Deaths on day: 1	2	3	Survived 3 days	Av. no. of days survived at 3 days
2·5	5	42	0	0	1	41	3·0
	5	30	7	11	4	8	1·4
5	1	12	2	0	1	9	2·4
	1	12	10	2	..	0	0·2
10	1	12	0	0	0	12	3·0
	1	12	11	1	..	0	0·1

Antitoxin was administered subcutaneously immediately after infection.

In table II are shown six experiments in which the effect of combined treatment with antitoxin and local chemotherapy is compared with the effect of antitoxin or local chemotherapy alone at various stages of the infection. It will be seen that combined treatment gave higher survival-times than treatment with either measure alone at all stages of the infection up to 6 hours after infection. This is especially well seen in expt. 2 where the dose of antitoxin was cut down sufficiently to allow only one mouse to survive after the first day and where proflavine was apparently without effect; in spite of the negligible curative action of these remedies when given separately they had a considerable saving effect when given in combination.

The results are summarised in table III where it will be seen that the advantageous effect of adding local chemotherapy to treatment with antitoxin was greatest when treatment was commenced at 4 and 6 hours after infection (expts. 5 and 6). This is remarkable because the organisms have already invaded the blood-stream at this time with the result that local chemotherapy alone has very little effect (McIntosh and Selbie 1942, 1943). It is also shown in table III that, irrespective of the times when treatment was given, the addition of local chemotherapy to antitoxin doubled the proportion of survivors and increased the average survival-time by 40%.

TABLE II—COMBINED ACTION OF ANTITOXIN AND LOCAL CHEMOTHERAPY ON *Cl. welchii* INFECTION IN MICE

Experiments	No. of mice	Deaths on day: 1	2	3	Survived 3 days	Av. no. of days survived
1—*Immediate treatment*						
Antitoxin, 2·5 units	6	0	4	1	1	1·5
Proflavine, 0·5 mg.	6	1	1	1	3	2·0
Antitoxin and proflavine ..	6	0	0	1	5	2·8
2—*Treatment at 1½ hrs.*						
Antitoxin, 1·0 unit	6	5	1	..	0	0·2
Proflavine, 0·5 mg.	6	6	..	..	0	0
Antitoxin and proflavine ..	6	3	1	1	1	1·0
3—*Treatment at 2½ hrs.*						
Antitoxin, 2·5 units	12	4	4	1	3	1·3
Proflavine, 0·5 mg.	12	12	..	..	0	0
Antitoxin and proflavine ..	12	3	4	0	5	1·6
4—*Local treatment at 3 hrs.*						
Antitoxin, 2·5 units at 3 and 6 hrs.	12	1	2	1	8	2·3
Penicillin, 50 units	12	7	3	0	2	0·8
Antitoxin and penicillin ..	12	1	1	0	10	2·6
5—*Local treatment at 4 hrs.*						
Antitoxin, 2·5 units at 4 and 7 hrs.	12	9	2	1	0	0·3
Antitoxin and proflavine, 0·5 mg.	12	8	2	0	2	0·7
Antitoxin and penicillin, 50 units	12	4	3	0	5	1·5
[illegible] 6 *hrs.*						
[illegible]	12	8	4	..	0	0·3
[illegible] proflavine, 0·5 mg.	12	9	1	1	1	0·5
Antitoxin and penicillin, 50 units	12	7	1	0	4	1·1

DISCUSSION

It has been shown by Henderson and Gorer (1940) that in intradermal infection with *Cl. septicum* in mice the combined action of oral sulphapyridine and antitoxin effects a saving of life much greater than would be expected from a mere summation; in *Cl. welchii* infection a noticeable synergic effect is produced but the evidence on this point is less clearly defined. Attempts to obtain similar results in conjunction with the experiments described here have so far failed. Thus, the addition of systemic therapy with sulphanilamide or penicillin to local chemotherapy or to combined treatment with antitoxin and local chemotherapy has not been advantageous and has occasionally tended to decrease the saving effect. This discrepancy, however, may be due to differences in the toxigenic and invasive powers of the strains of organisms used and in the type of experimental disease. All the evidence appears to indicate that both local and general chemotherapy are necessary adjuvants to antitoxin in the treatment of all stages of *Cl. welchii* infection.

The experimental results clearly show that measures directed towards dealing with the local infection are of great value even when the infection has become generalised. Such local measures would include full surgical toilet followed by the application of a chemotherapeutic agent. Until more effective remedies are available a finely ground mixture of 1% proflavine in sulphathiazole should be used (McIntosh and Selbie 1943). This mix-

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* This work was done on behalf of the War Wounds Committee of the Medical Research Council.

TABLE III—SUMMARY OF EXPERIMENTS ON COMBINED ACTION OF ANTITOXIN AND LOCAL CHEMOTHERAPY ON *Cl. welchii* INFECTION IN MICE

Expts.	Treatment commenced (hours)	Treatment	No. of mice	Survived 3 days		Av. no. of days survived at 3 days
				No.	%	
1, 2, 3	0–2½	Antitoxin	24	4	17	1·0
		Antitoxin and proflavine	24	11	46	1·8
4	3	Antitoxin	12	8	67	2·3
		Antitoxin and penicillin	12	10	83	2·6
5, 6	4–6	Antitoxin	24	0	0	0·3
		Antitoxin and proflavine	24	3	13	0·6
		Antitoxin and penicillin	24	9	38	1·3
1, 2, 3 4, 5, 6	0–6	Antitoxin	60	12	20	1·0
		Antitoxin and local therapy	84	33	39	1·4

ture is effective against *Cl. welchii, Cl. œdematiens* and *Cl. septicum*, the three main causal organisms of gas gangrene, and has the advantage of diminishing the local toxic effects of proflavine which are considerable when proflavine crystals are applied to healthy tissue in large amounts (Russell and Falconer 1943, Hawking 1943).

Our results also emphasise the importance of early treatment. Whether the therapeutic measures are chemotherapy or serum therapy or both, they should be initiated before serious deterioration of the tissues sets in, and the sooner the better. In our experimental disease in mice the limiting period appears to be 4 or 5 hours after the inception of infection. Thus the time factor is of the utmost importance in the treatment of anaerobic infections.

SUMMARY

Antitoxin treatment combined with local chemotherapy is more effective than antitoxin or chemotherapy alone in the treatment of *Cl. welchii* infection in mice.

The results indicate that all cases of gas gangrene should receive as soon as possible adequate doses of antitoxin combined with full local treatment.

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Medical Societies

SOCIETY OF MEDICAL OFFICERS OF HEALTH

AT a meeting of the fever hospital medical services group on June 18, with Dr. ANDREW TOPPING (LCC) in the chair, a discussion on

Administrative and Clinical Control of Diphtheria

was opened by Dr. J. A. SCOTT (Fulham), who said that before immunisation was practised in this country there were about 60,000 cases of diphtheria in England and Wales annually, of which 3000 died. Comparing this with an average of 600,000 births annually the risk of catching diphtheria before the age of fifteen was about 1 in 10. Active immunisation could not be expected to reduce the carrier-rate, which might even increase in partially immunised communities. Hence there was a fair chance of recovering diphtheria bacilli from swabs from immunised children, whether they were suffering from diphtheria or not. In Fulham over 3000 children were immunised during 1934–41, but the number had now increased to over 10,000. After a preliminary period pre-Schick testing was dropped but a post-Schick test was always performed. Among immunised children 22 cases had been notified, but the diagnosis was not confirmed in 6. Of the remaining 16 confirmed cases, 5 contracted diphtheria before full immunity could have developed. In 1 case, on whom there had been no post-Schick test, the attack was fatal. More than half of all children under fifteen in Fulham were now immunised, and the average number of cases of diphtheria per year had dropped from 350 to 50. A parallel decrease in incidence could also be shown for the County of London, where immunisation had been actively pursued in most boroughs since 1931. Dr. Scott encouraged the early admission to hospital of diphtheria cases without waiting

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and a misleading impression given of the incidence of diphtheria in the immunised population. De-notification was not a simple problem, since parents were sometimes more inclined to blame the doctor for what they con-

into account overcrowding, loss of employment among intimate home contacts and so forth, the proper solution was an easy system of hospital admission. Administratively, however, there was a need to correct preliminary notification figures in the light of the final diagnosis. Such a system would probably increase difficulties in hospitals with a shortage of isolation accommodation, but some relief might be expected from a decrease in the incidence of diphtheria. The admission of cases on a diagnosis of suspected diphtheria had much to commend it provided a reliable and prompt system of informing borough MOHs of the corrected diagnosis was evolved. The anti-vaccination societies would doubtless regard

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was all important and would provide the only answer the antivaccinationists needed.

Dr. NORMAN BEGG (LCC) said that the major problem of diphtheria in hospital was the disposal and management of doubtful cases. The disease always ranked high among those which tended to be erroneously diagnosed. In 1058 diphtheria admissions to the Eastern Hospital the diagnosis was not confirmed in 35·4%, compared with a diagnostic error of 13·3% in scarlet fever, 11·5% in measles and 10·7% in whooping-cough. The commonest mistake was to confuse diphtheria with other throat infections, particularly those due to the hæmolytic streptococcus. In rather less than half of all certified cases it was possible to arrive at a presumptive diagnosis of diphtheria on admission. This meant that for every bed provided for diphtheria in an open ward at least one other bed must be available for isolation and investigation of doubtful cases. At present isolation accommodation to this extent could only be provided in barrier-nursing wards. In investigating doubtful cases the clinical findings were easily the most important. Too much stress was laid on bacteriological examination, which was often incomplete unless it included full identification of the diphtheria bacillus and specific examination for hæmolytic streptococci and Vincent's organisms.

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of 60 such admissions, diphtheria was confirmed in only 13 cases, and 4 of the cases had contracted diphtheria before immunisation was complete. In the single fatal case, a tracheotomised one, details of immunisation, which had been done in an evacuation area, were uncertain. To put no hindrance on admitting suspect diphtheria cases to hospital would encourage early admission and do away with the need for attaching a definite certificate when in doubt about the diagnosis. But it would not result in more accurate diagnosis in the home, nor solve the problem of shortage of isolation accommodation. He favoured the setting up of a clinical consultant service in infectious diseases closely linked with a good laboratory service—all to be available to see patients in the home, or in the hospital outpatient or inpatient department. Consultation should be sought, not in isolated cases of doubt but in all cases who would normally be sent to hospital.

Dr. ROBERT CRUICKSHANK (LCC) said that clinical diagnosis was clearly not easy, for 5–6 out of every 10 notified cases admitted to the North-Western Hospital were not diphtheritic infections. Much unnecessary trouble, both to parents and to hospital superintendents, would be avoided if doubtful cases were given an injection of antitoxin at home, and a swab sent for examination by a reliable laboratory. Many doctors were still unaware of the refinement in antitoxin which allowed an adequate dose for an early doubtful case to be given in 2–3 c.cm. with the minimum risk of reaction. An accurate laboratory diagnosis of diphtheria could only be obtained by the use of a tellurite medium, and culture on blood-agar was required to identify streptococcal infection. The Loeffler slope was still useful for early diagnosis, but it missed up to 30% of clinical infections and gave false-positive cultures with swabs from ear, nose or wound. The tellurite medium, on the other hand, besides checking the clinical diagnosis identified the infecting type as gravis, intermedius or mitis, eliminated false positives and minimised the need for virulence testing since all gravis and intermedius strains are toxigenic. Identification of type was also of prognostic value, paralytic complications being more common (10–15%) with gravis and intermedius than with mitis (4%). Use of the tellurite medium in the discharge of patients from hospital had been criticised on the grounds that it encouraged the unnecessary detention of the patient in hospital just because he had a few diphtheria bacilli in his throat. A comparative analysis of tellurite and Loeffler cultures from dismissal swabs showed that only a fifth of the patients were kept longer in hospital because of positive cultures on the tellurite medium when the Loeffler cultures were negative; of these more than half were ready for discharge within 2 weeks. Persistence of the carrier condition was due to unhealthy mucous membranes, reinfection and secondary streptococcal infection. The detection of carriers was also facilitated by the tellurite medium, which, besides being less laborious, allowed a correct and quantitative report within 2 days, and by identifying the infecting type helped to trace the source of infection. Swabs for discharge and for detection of carriers must always be taken from nose as well as throat. Knowledge of the relative incidence of the infecting types was essential for the study of the epidemiology of diphtheria.

The CHAIRMAN thought the public could be educated to appreciate the practitioner's action in sending a doubtful case to hospital even if the diagnosis was not confirmed. The difficulty of adequate isolation accommodation was not insurmountable; we might have to aim at 60% of single-bedded units in the future. He favoured the provision of a consultant service and a wider use of the senior staff of fever hospitals in field epidemiology.

Dr. VICTOR FREEMAN (Islington) said that in large-scale immunisation labour could be saved by omitting the pre-Schick test in children up to nine years. He had had only 6 confirmed cases of diphtheria in his area among fully immunised children, and only 1 of these had a severe attack. He asked for full and accurate record-keeping in all areas undertaking diphtheria immunisation.

Dr. GUY BOUSFIELD (Camberwell) had not encountered one death from diphtheria in a fully immunised child during fourteen years. He strongly favoured frequent control of Schick-test toxin on primary cases and thought that some failures in immunisation were attributable to faulty post-Schick testing or testing with weak material. He was also struck by the low incidence of paralysis in immunised cases who later contracted diphtheria. Dr. BEGG agreed with him that in the immunised cases from the Eastern Hospital the course was usually more favourable than would have been expected from the initia severity.

Dr. E. C. BENN (Leeds) described 3 deaths from diphtheria in immunised children, but in 1 the post-Schick test had been positive. A more common picture was a mild sore throat with few or no clinical signs on admission to hospital. These cases should be classified as true diphtheritic infections in children with a high degree of immunity. Other speakers agreed and Dr. CRUICKSHANK pointed out that these cases, which he preferred to call diphtheritic tonsillitis, were almost invariably due either to a gravis or intermedius infection.

Dr. H. M. LEETE (Hull) thought it right to admit that diphtheria can occur in immunes, but as a modified disease. He had seen neither death nor paralysis in an immunised case. He described cases with limited membrane in which no antitoxin had been given where there had been a sharp rise in the blood-antitoxin titre within ten days. The post-Schick test might be omitted provided a reliable antigen was injected in proper doses and at an adequate interval.

Dr. A. L. K. RANKIN (Twickenham), who also favoured the early admission of suspect cases, informs the MOH on the evening of admission whether a certified diphtheria case is one of (*a*) clinical diphtheria, (*b*) no clinical evidence of diphtheria, or (*c*) under observation.

Dr. IAN TAYLOR (LCC) thought that too much had been made of the possibility of immunisation increasing the carrier-rate. A recent survey of some thousands of London school-children showed that 63% had now been immunised and yet the general carrier-rate was well under 1%. He supported the idea of a consultant service in infectious diseases and thought it unimportant whether it came from the hospital or the public-health authority. Better teaching facilities in fever for students were important.

Dr. R. A. O'BRIEN (Beckenham) thought it clear that natural cures from diphtheria in pre-antitoxin days had depended on the patient producing antitoxin himself, and this was supported by his own observation on a group of mild cases of diphtheria where the titre of antitoxin in the blood rose steeply in convalescence.

Reviews of Books

Advances in Internal Medicine

Vol. I. Editor: J. MURRAY STEELE, MD; Welfare Hospital, New York University Division. (Heinemann. Pp. 292. 21s.)

THIS book comprises ten reviews, each of a subject which has recently attracted interest, and each by a man who has participated in its investigation. As the title implies these reviews are concerned with advanced work, and some knowledge—not always merely elementary—of the subjects is necessary if the articles are to be read with profit. The first, on the uses of the Miller-Abbott tube in diagnosis and treatment, is a straightforward account by one of the inventors, and should encourage judicious use of this technique in practice. The article on the use of insulin and protamine insulin in the treatment of diabetes contains little fresh, but shows that transatlantic thought on diabetes is breaking free from the rigid "overproduction" theory. The article on the sympathetic nervous control of the peripheral vascular system by Wilkins is full, and is followed by two articles on the sulphonamide drugs; Macleod is lucid on their mode of action; Keafer discusses the evidence for the use of particular sulphonamides in different illnesses. It seems likely that, leaving out of account one or two illnesses which respond to individual sulphonamides, the practical problem is to agree which is the most efficient and least toxic of these drugs. A section on infections of the urinary tract summarises much useful experience, but the view that chronic pyelonephritis is an important factor in the pathogenesis of hypertension is not proven or generally accepted. Other reviews cover epidemic influenza, nephrosis, and ariboflavinosis.

Air Raid First Aid

(2nd ed.) W. A. ASHFORD. (Williams & Norgate. Pp. 46. 1s. 6d.)

IT is only nine months since this useful little summary first appeared. It compresses into small space the modifications of classic first-aid treatment which have become necessary under blitz conditions, and we are happy to observe that the three errors noted in the first edition have been corrected.

THE LANCET

LONDON: SATURDAY, AUGUST 21, 1943

REHABILITATION AND SOCIAL SECURITY

Assumption B of the Beveridge report covers not only medical treatment in all its forms but also what he calls "postmedical" rehabilitation—an unhappy term, for some measure of medical supervision is necessary right up to the point of full fitness for work Beveridge puts forward the general propositions that rehabilitation must be continued till maximum earning capacity is restored, that a service for this purpose should be available for all disabled persons who can profit by it irrespective of the cause of disability, and that cash allowances to persons receiving rehabilitation should be the same as training benefit, including removal and lodging allowances where required. No reliable estimate has yet been made of the number of people likely to need rehabilitation, but from the Home Office statistics on workmen's compensation for 1938 (Cmd 6203) it emerges that of every 100 compensated cases of disability arising from accident terminating during the year 3 6 had lasted for 26 weeks or more; while of every 100 cases of compensated industrial disease terminating during the year 17 had lasted for more than six months. The total number of cases in which compensation was paid under the Workmen's Compensation Act in that year was 459,223, equivalent to 5·82% of the industrial population at risk. Similar figures are not available about incapacitating sickness among the insured population generally, but in Scotland, according to a report[1] issued by the Department of Health, the average duration in days of terminated incapacities in 1936–37 among men of 30–49 was: tuberculosis, 650; diabetes, 189; anæmia, 117; cardiac debility, 108; neurasthenia or neurosis, 188; "disordered action of the heart" and tachycardia, 124. The average duration of terminated incapacity from all causes among men of this age-group was 40 days. For older men the incapacities were always longer and for women they were no shorter, except in cases of anæmia. It is obvious from these figures that there must be many patients who require rehabilitation before returning to work after long illness.

The results of rehabilitation judged by actual return to work may well be better where compensation plays no part, and there is much to be said against restricting the provision of rehabilitation facilities to compensation cases. The relation of workmen's compensation to rehabilitation is likely to assume great administrative importance. Sometimes a man who has been injured and been treated in a rehabilitation centre is restored to a level of functional efficiency which the medical officer at the centre regards as compatible with return to work, but the man feels that he should not go back until his title to compensation has been fully thrashed out. The Workmen's Compensation Act does not give a workman any right to compensation in respect of his injuries but only in respect of wages which he is unable to earn as a result of his accident, and an injured workman often thinks that some solatium is due to him and is tempted to secure as much as he can by way of compensation for loss of earning capacity. Attendance at a rehabilitation (or "fitness") centre is not compulsory, and the utmost care must be taken that no report from such a centre financed by public funds is allowed to prejudice a man's compensation status. At the same time, a man who has completed his course at a rehabilitation centre should return to work without any intervening spell of idleness which must inevitably undo the success of his treatment there. Many have found with Collie,[2] that "the fear of finding work too laborious, or of not finding it at all, is a factor which retards the normal recovery of many who have suffered as a result of injury or illness." This principle is insisted on in a memo[3] lately issued by the Miners Welfare Commission. Sir William Beveridge came to the conclusion that workmen's compensation—the pioneer system of social security in Britain—was based on a wrong principle and has been dominated by a wrong outlook "in 45 years" he says, "the present system has contributed little or nothing to the most important purpose of all, which should have come first—namely, restoration of the injured employee to the greatest possible degree of production and earning as soon as possible He recalls that in 1940 the Accident Offices Association described rehabilitation as not being their concern, though they modified this attitude later. The line now taken[4] by the association is that, while improved treatment and rehabilitation would reduce the cost of compensation for accidents, the shortening of incapacity is part of the general problem of medical services, since the proportion of accidents due to employment is probably not greater than 1 in 3.

The Delevingne Committee expressed the view that, so long as a patient requires to be under treatment by the fracture surgeon, he should continue to receive compensation as for total disability unless he is fit for light work of a remedial character approved by the fracture surgeon and is receiving wages. This light work has long been one of the major difficulties in the administration of the Workmen's Compensation Act The accident offices point out that the incidence of accidents and the amount of cooperation in dealing with them depend on the nature of the work, the plant used, the extent and efficiency of safeguards, management and training, and on the willingness to re-employ and the possibility of re-employing injured men: there are not many light jobs in a coal mine, and usually more candidates than jobs. Collie thought that if after an accident a man was found to be fit for light work it was well that he should be so informed and light work found for him, but he recognised that "light work is not always satisfactory from a psychological point of view. . . . To report a man as fit for light work only is not the truest kindness" He believed that incapacity is often extended by "hystero-neurasthenia," and that functional disease has multiplied time and time again since the inception of the Workmen's Compensation Act. The Holman Gregory Committee of 1919 was satisfied that "the average workman is anxious to return to his work as soon as he is able and is not disposed to malinger." Lump-sum settlements have been another source of difficulty. It has been argued on the one hand that many men who have sustained an injury anticipate a lump-sum settlement and until that is received incapacity may extend for months or even years, during which time idleness makes them more and more unfit for work; and on the other that in lump-sum settlements the object activating employers is not merely to end their liability but to reduce their commitments, and that the circumstances of lump-sum bargaining are heavily weighted against the workman.

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[1] Seventh Report on Incapacitating Sickness, 1939.

[2] Collie, J. Workmen's Compensation in the Medical Aspect, London, 1933

[3] Rehabilitation Treatment for Injured Coal Miners, July 1943.

[4] Workmen's Compensation, London: Accident Offices Association, 1942.

> The story is told of a man in Fife who owned a horse and cart which he sold to any miner who had recently received a lump sum and who thereupon set up as a general dealer. When the business failed, as always happened, the cart and a very thin horse were sold back to the original owner for a small sum. When the horse had been rehabilitated the outfit was resold to the next miner who received a lump sum and so the pernicious system continued, benefiting only the original owner of the horse and cart.

The circumstances of every proposed lump-sum settlement should be carefully reviewed by an impartial observer, preferably after unbiased medical advice on the nature and extent of residual disability and in the light of future employment. The Minister of Pensions has announced that a war pension will not be commutable into a lump sum.

Rehabilitation is the rounding off of good hospital treatment, says the Miners Welfare Commission's memo; used as a salvaging process for inferior hospital treatment it will prove disappointing. The primary consideration must be to ensure early and intensive treatment of all patients, whether they are incapacitated from accident or from disease, whether involving compensation or not, and to provide the resources of a national rehabilitation service where that is necessary to carry restoration to the point of fitness to return to work. Rehabilitation is, alike to the injured person and to society, of even greater importance than immediate cash payment, always assuming that the latter is sufficient to maintain a reasonable standard of living and to allay pressing financial anxiety. One of the changes proposed by BEVERIDGE is suspension of the present scheme of workmen's compensation and inclusion of provision for industrial accident or disease within the unified social service scheme, subject to special provision for finance and benefits. He proposes that all forms of short-term disability (up to 13 weeks) should be dealt with by a cash benefit—that is, by payment at the same flat-rate irrespective of earnings—but that after 13 weeks compensation should take account of earnings that have been lost, with industrial pensions for prolonged incapacity due to accident or disease arising out of and in the course of employment. For long there has been a measure of opinion that the whole system under which workmen's compensation is administered is defective, and that it should be replaced by the appointment of a commissioner with wide powers. BEVERIDGE does not speak specifically of mechanism of administration, but he contemplates that the structure should be administrative rather than legal. There have been various suggestions designed to ease the medical difficulties inherent in workmen's compensation: that the medical referee should be a public officer dealing exclusively with workmen's compensation, or as SMITH WHITTAKER urged, that the regional me [illegible] of Health should include [illegible] duties. Existing practice which makes it possible for either side to call medical witnesses prepared to give irreconcilable evidence on oath for their respective clients on medical issues is a fruitful source of expense and has long made a lawyer's paradise. The medical board for silicosis has now operated sufficiently long to render possible an appraisal of the success of this new method of administrative approach to medical assessment of disability in relation to workmen's compensation. The report of the Tomlinson Committee has thrown into relief the importance of rehabilitation, and in the near future the Government must give thought to the many problems that will arise from it—among them the organisation of a rehabilitation service (comprehensive in scope and effectively linked with health services and with industry), the payment of allowances during rehabilitation, and the relationship of workmen's compensation to rehabilitation and subsequent return to work. These are all subjects on which there should be a considered professional opinion.

FLIES AND POLIOMYELITIS

HE is a bold man who would today dogmatise about the epidemiology of poliomyelitis. It is in the transition stage from the respiratory to the intestinal group of infections, and the evidence that the virus has its entrance and exit via the alimentary tract daily grows stronger. Epidemiologists may still believe with FROST and MAXCY that there are valid grounds for regarding poliomyelitis as a droplet or direct-contact infection, but the strongest evidence for this view came from the experimentalist who recovered the virus from the nasopharynx and then infected monkeys with it by intranasal instillation. The virus was shown to spread by the olfactory tracts to the central nervous system, and infection could be prevented by cutting the tracts or by chemical blockade of the nasal mucosa. However, these experiments were done mostly with a single strain (MV) of the virus which had become adapted to the rhesus monkey. Recent work has shown that another species, the cynomolgos or Java monkey, is more susceptible to freshly isolated virus, and this species can be infected by swabbing the pharynx with the virus, feeding the monkey with virus-soaked bananas by mouth or stomach-tube, and even by implanting the virus in an isolated loop of bowel. Chimpanzees have been similarly infected even when the olfactory nerves were cut. In the natural infection in children, virus has been recovered from the fæces of acute, convalescent and abortive cases, and from symptomless contacts; it is demonstrable much more frequently in the fæces of young than of older affected children, and, particularly in convalescence, more often in the fæces than in the nasopharynx, which is almost part of the alimentary as well as of the respiratory tract. The presence of virus in the fæces might simply mean that it was being swallowed, as tubercle bacilli are, so that the data obtained by SABIN and WARD [1] from 11 autopsied patients are particularly valuable. They failed to isolate virus from the nasal mucosa, olfactory bulbs or non-motor cerebrum, but recovered it from the pharynx, ileum

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[1] Sabin, A. B., Ward, R. *J. exp. Med.* 1941, 73, 771.

and abdominal sympathetic (once), and from the motor cortex, medulla, pons, and cervical and lumbar segments of the cord. Thus there is strong presumptive evidence that the virus of poliomyelitis enters the body by the alimentary tract, probably multiplies there, and reaches the central nervous system indirectly.

This altered picture of the pathogenesis of the disease naturally suggested a mode of spread in the community different from that of direct-contact infection. The summer and autumn prevalence, the apparent distribution along water-courses of several epidemics, and the greater incidence in rural or suburban areas all pointed to an ingestion rather than an inhalation type of infection. Although large epidemics have not had the characteristic features of a water- or milk-borne disease, recent recognition of the high incidence of abortive cases has shown that the infection often has an explosive character in families and small groups. The possibility of an insect as vector has long been in the mind of the epidemiologist, and the detailed report by **Trask, Paul** and **Melnick**,[2] following a preliminary announcement 2 years ago, confirms earlier isolated claims that certain species of flies do in fact carry the virus. These positive findings come after a period of unsuccessful attempts, and are probably correlated with the substitution of the Java for the rhesus monkey. They have been corroborated by **Toomey** and his associates[3] and by **Sabin** and **Ward**.[4] The method adopted by **Trask** was to set fly-traps out of doors near a privy or a house where one or more cases of poliomyelitis had occurred. In addition, biting insects were sometimes caught by butterfly nets, using tethered cows in the epidemic area as decoys. The separate catches, each ranging from 100 to 600 flies, were either kept in the icebox (7° C.) for 3–7 days, when the jars became covered with fly-excrement, or were sprayed with ether and the dead flies then transferred to another jar until ready for use. Either fly-washings, which included excrement, or emulsions of disintegrated flies were used to inoculate monkeys intranasally (2 c.cm. on each of three successive days) and intraperitoneally (one dose of 10–20 c.cm. of an etherised suspension). Of 37 satisfactory tests there were 4 positives and 1 probable in 21 inoculated Java monkeys, whereas there were no takes among 10 green African and 6 rhesus monkeys. Preliminary identification of the species in each catch showed that the flies commonly present in both positive and negative samples were green bottle and blow flies; there were some common house-flies in 2 of the 4 positive specimens. The biting stable-fly was not identified in any of the positive samples, nor was virus recovered from catches of biting flies in an area where non-biting flies yielded positive results.

The circumstances under which the positive results were obtained[5] are interesting. The samples were all collected in epidemic areas—a space of 15–20 acres surrounding or adjacent to the dwellings of one or more patients who had acquired poliomyelitis. The catches were made either during the epidemic period—within 10–12 days after onset of the infection—or after the epidemic was over. Of 8 samples collected within the epidemic period 4 were positive, whereas 8 samples collected after the epidemic period were all negative. In at least 3 of the 4 positive samples the insects were collected within a few yards of the potential source of human virus, in the form of freshly passed fæces from a known paralytic or abortive case. It is impossible at this stage to say if the virus actually multiplies in the body of the carrier fly. But it is established that certain species of flies carry the virus of poliomyelitis and may thereby contribute to its spread by contaminating food or drink.

TANNIC ACID AND LIVER NECROSIS

The treatment of burns by the local application of solutions of tannic acid, introduced by **Davidson** in 1925, was quickly hailed as a great advance, so that before long most burns were dealt with by immediate tanning. In time various minor modifications of the original method were adopted by different surgeons—slow and rapid tanning, and the combination or succession of solutions of tannic acid and silver nitrate. The death-rate from burns, in almost all the published figures, rapidly fell from 1925, and although part of this improvement must be attributed to concurrent advances in the treatment of shock and dehydration, much of it seemed clearly to be due to the tannic-acid treatment. When this war began, burns were quickly recognised to be a greater hazard than in all previous campaigns, and tannic acid was at first almost universally employed. Doubts soon began to arise about the tanning of burns of the face and hands, because of late contracture, but this point need not concern us here. Severe burns still too often ended fatally in spite of treatment, and active investigations into the many problems involved—shock, dehydration, toxæmia, acute duodenal ulcer and so on—were being pursued before the war, especially by **Wilson** and his colleagues in Scotland and later in the Middle East. In 1938 they[1] had reported severe necrotic damage to the liver in fatal burns, and **Belt**[2] described the hepatic changes in detail. **Wilson's** observations aroused suspicion of the toxicity of tannic acid, as he was able to demonstrate a similar liver lesion in animals injected with tannic acid or sodium tannate. His subsequent work is mainly contained in confidential Service reports, but last year **Wells, Humphrey** and **Coll**[3] in America described severe liver necrosis in fatal human burns, and reproduced this lesion in rats by injecting tannic acid. As **Barnes** and **Rossiter** point out on p. 218, it seems that the special type of liver damage (universal central necrosis of lobules) was not seen before tannic acid was used in treatment, and **Allen** and **Koch**[4] who have not used the tanning method found no liver damage in any of their fatal cases. The observations of **Wells** and his colleagues, as they became widely known, rapidly began to shake confidence in tannic acid, and many surgeons turned to other methods, new or old. Lately, for example, **Pendleton**[5] has drawn attention to the advantages of a spray of paraffin wax, sulphanilamide and other ingredients, an adaptation of the 'Ambrine' popular

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[2] Trask, J. D., Paul, J. R., Melnick, J. L. *Ibid*, 1943, 77, 331.
[3] Toomey, J. A., Takacs, W. S., Tischer, L. A. *Proc. Soc. exp. Biol., N.Y.* 1941, 48, 637.
[4] Sabin, A. B., Ward, R. *Science*, 1941, 94, 590; 1942, 95, 300.
[5] Trask, J. D., Paul, J. R. *J. exp. Med.* 1943, 77, 545.

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[1] , C. P. *Brit. J. Surg.*
[2]
[3] *New Engl. J. Med.* 1942, 226, 629
[4] Allen, H. S. and Koch, S. L. *Surg. Gynec. Obstet.* 1942, 74, 914.
[5] Pendleton, R. C. *J. Amer. med. Ass.* 1943, 122, 414.

in the last war. ERB, MORGAN and FARMER[6] have published an account of 61 fatal burns, all examined carefully by the same pathologist (ERB) between 1920 and 1942. In all, 41 of the cases had been tanned, and 25 of these showed definite hepatic necrosis at autopsy, while this lesion was completely absent in 21 untanned patients. Their records seem to bear out the great reduction in the mortality of burns after tannic acid was first used in 1925—from 32·2% to 11·8%—but they add that the introduction of sulphonamides and other methods have further reduced the mortality. A fact also brought out by their figures is the transfer, after tannic-acid treatment, of the main mortality from the primary period of shock (12–36 hours) to the period of toxæmia (3–6 days), the time when the necrotic lesion in the liver is most often found.

As these facts accumulated, it became clear that the toxicity of tannic acid, its relation to the hepatic damage noted, and the question whether this method of treating burns should be abandoned all required active investigation, and much work has been done on these lines both here and in America. CAMERON, MILTON and ALLEN, whose paper appeared in these columns last week, have experimentally investigated the toxicity of tannic acid when introduced into the animal body by various routes, and the chances of its absorption through burnt surfaces. They show that gallic acid, often contained in commercial samples of tannic acid, is harmless, but prove conclusively that tannic acid is a toxic drug. Its main effects are hæmoconcentration, great œdema at the site of injection, loss of plasma proteins, renal damage and hepatic necrosis. The main part of the liver lesion is a coagulation necrosis of the centres of all the lobules. In the later stages of non-fatal experiments they note the early evidence of the remarkable power of the liver lobules for repair. Their experiments leave no doubt that tannic acid is absorbed from large burnt surfaces, and can be demonstrated in the tissues, including liver and kidneys, by suitable tests. BARNES and ROSSITER describe in this issue how to obtain burned surfaces of more or less uniform size for animal experiment. They confirm in general all the toxic effects of parenteral administration, and report slight liver damage after the application of tannic acid to a fresh burnt area, amounting to about a quarter of the body surface of a guineapig. They lay stress on two other effects of tannic-acid applications, not previously noted—a higher mortality in the tanned animals, and a striking loss of weight as compared with controls. With CLARK, ROSSITER has demonstrated impaired liver function in rabbits injected with tannic acid, the results being more variable after intravenous than after subcutaneous injection, presumably because the toxic effect is more sustained with the latter route. These workers are rightly cautious in interpreting their experimental results. CAMERON and his colleagues claim only to have proved the toxicity of tannic acid in animals, and that the drug can be absorbed through raw burned surfaces; the Oxford workers confirm this.

In the end the tannic-acid treatment of burns must stand or fall on the clinical evidence, and the records of ERB, MORGAN and FARMER of Toronto already show that great caution is required in tanning large burnt surfaces. There is clearly a great difference between the effects of tannic-acid injection and its application to a burn, and even if slight hepatic damage, rapidly capable of repair, occasionally ensued from tanning a small or moderate sized area, this would not condemn the method provided it had advantages over all the others available. It has lately been claimed, however, that disadvantages, such as slowness of healing under the dense and firm tan, outweigh the advantages of the method. It seems possible that newer procedures, now under trial, will entirely supersede tannic acid, or that tannic acid will remain the application of choice for smaller burns of the body requiring immediate treatment in difficult circumstances such as on the battlefield or at sea.

HOT DINNERS FOR SCHOOL-CHILDREN

REASONS for communal feeding in war-time are obvious—economy of labour, time and fuel alone would justify the setting up of canteens and a large extension of the system of school meals. But if communal feeding of school-children is to be widespread it must first become popular. Mr. F. LE GROS CLARK, whose intimate knowledge of the subject is reflected in reports summarised on p. 235, has shown how, little by little, the indifference or opposition of parents and authorities has been or is being overcome. Up to 1939 few of the large boroughs were providing meals for payment, though a considerable number of free meals were being supplied to necessitous children. In many cases these meals were eaten in "feeding centres," separate from the schools, and a flavour of poor-law and charity seemed to many of the more self-respecting parents to be associated with them. From the summer of 1940 the Board of Education made a special effort by circulars and visits of peripatetic inspectors to exorcise this bogy: the board's steadfast belief that meals should be associated with education was emphasised by insistence that children should dine in their schools, where possible under the supervision of their teachers. After some early hesitancy the public demand for school meals began to grow. Success bred success, and an attractive circular letter to parents often brought demands far in excess of the available accommodation.

The Ministry of Food and the Board of Education are agreed about the value of school meals, and the board's circular addressed to local education authorities in May urges a great speed-up in the arrangements. A rise in two years from 300,000 to a million and a quarter children having dinner at school is a striking one, but the circular says: "It will not be possible to hold that school-children have been made as secure as is reasonably possible in the circumstances against nutritional dangers arising from the war until the majority of them are able to have a hot midday meal at school, planned to meet fully their needs for health, growth and energy." The board aims at providing meals for three-quarters of the nation's elementary and secondary school pupils. The Government's offer to adapt existing schools, and, where necessary to supply, erect and equip kitchens, sculleries and canteens free of charge bodes well for the future. Evidently the board has more than the present war period in view, and there is reason to hope that hot dinners will persist as a regular feature of school life. The white-paper on education (Cmd. 6458) again emphasises the importance of proper feeding of children, and foreshadows the conversion of the powers of education authorities to provide school meals into a duty. Speaking in Yorkshire recently, Mr. R. A. BUTLER said that to a large proportion of our children a hot dinner every day was in itself a revolution, and added "the dinner we are trying to provide is not just a dinner, but a very good dinner indeed."

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[6] I. H., Morgan, E. M. and Farmer, A. W. *Ann. Surg.* February, 43, p. 234.

Who is to be responsible for seeing that the standard of food is kept at the level recommended by the board—a meal supplying about half the child's daily requirements of protein and fat and a reasonable proportion of vitamins? In past years the board's chief medical officer has suggested that school medical officers and their assistants should undertake "effective supervision" of school meals. According to LE GROS CLARK[1] medical officers vary extremely in the time and attention they give to this, and with the immense expansion of canteens envisaged it seems unlikely that they will have time for the increased work involved; this duty may be undertaken entirely by the Board of Education inspectors of school meals, whose numbers have lately been increased, but their time is occupied with general instruction and advice. It seems hardly fair to expect teachers to give up their *lunch-hour to supervising the children's dinner.* No great difficulty appears to have arisen in securing suitable staffs to run the canteens. The planning and cooking of well-balanced and varied meals every day in the week calls for considerable skill and knowledge of food values. Here is a promising field for those trained in dietetics and having a real interest in the nutritional welfare of our children.

Annotations

TUBERCULOSIS NURSING

THE General Nursing Council and the Royal College of Nursing have rejected the suggestion of the Rushcliffe Committee that tuberculosis nursing should be given a separate section on the Register of Nurses. The need to consider the nursing service as a whole grows daily more acute; it will not be met if one branch after another adopts the rôle of isolationist. What reason is there for demanding separate registration for tuberculosis nursing and not regarding it as an integral part of general nursing? Nursing techniques, whether medical or surgical, are based on the same principles whatever the nature of the illness *or the grouping* of the patients. There was a time when tuberculosis was just a discard from the general hospital, of little interest either for doctors or nurses. The memory of that time still lingers although the treatment of tubercle, whether at hospital, sanatorium, colony or dispensary, has become as varied and interesting as any branch of medicine. Moreover, the prospect for the patient has changed radically now that public opinion has decided that the blight of economic anxiety is to be lifted from him. This moment, when tuberculosis, so long exiled, is being received back into the home of general medicine, is not the time to create a new and segregated order among those who nurse it. Competition for entrants to nursing has affected adversely both sanatoriums and mental hospitals, whose staffing probably have indeed much in common. Sanatoriums (and mental hospitals too) really need a large proportion of fully trained staff; sisters, charge nurses and staff should all be required to hold the SRN certificate. Effective ways must be found to attract them, and of these the first might well be liberty and means to live outside the institution. There would also have to be a large permanent staff of trained assistant nurses as soon as they become enrolled and available. Besides these, a changing population of student nurses—girls taking general training in the hospitals of the region—would be sent for 3–6 months of experience of tuberculosis nursing as a part of their course. This would serve a double purpose, for whatever direction her work may take in the future every nurse should be well trained in the care of tuberculous patients if only because she needs to protect herself and her other patients when a chance case of tuberculosis is admitted to a general ward. There is reason to think that the incidence of tuberculosis is higher—probably considerably higher—among nurses in general hospitals than among those working in sanatoriums; which may well be due in part to faulty management of the occasional case of open tuberculosis. Those who are later to undertake district or public-health nursing must fully understand the management of tuberculosis in the home and the risks to contacts if they are to become the exponents of prevention and positive health. It has been said that the care of the tuberculous does not readily appeal to young girls, and that then distaste springs partly from ignorance and partly from fear of infection. Both of these bogies would be laid by a sound regional plan in which tuberculosis would take its proper place in general training. Segregation will never achieve it.

THE REFUSAL TO REMEMBER

HYSTERICAL symptoms tend to follow the fashion. Medieval witches had intercourse with the devil, while village maidens conversed with saints. Victorian ladies developed astasia abasia or that glove-and-stocking anæsthesia now seldom worn. Psychogenic symptoms are usually either imitations of actions seen or read about, or are reversions to the behaviour patterns of childhood. As "loss of memory" is accepted by the community as illness rather than carelessness, amnesia is to be found in soldiers who have overstayed their leave.

The origin of psychogenic amnesia is emotional distress. The patient is unable to face his situation and walks out on it. During this period he is probably aware of his actions, and his behaviour appears normal to others, provided he is not interrogated. After wandering for eight hours or so, the need for food or shelter forces him to realise that his behaviour has not only not solved his original worry but has created the additional problem of explaining his recent conduct. It is probable that the amnesia develops only when he decides to give himself up or when he is confronted with authority—a mild panic reaction. Like the guilty child who denies his misdeeds, the patient denies himself. Children often run away from difficult situations, but are unaware of the need to develop amnesia, which is an adult rationalisation. If the precipitating factor in such cases seems inadequate, allowance must be made for the simpler ideation and emotional level of children and hysterics.

No sharp division can be made between hysterical amnesia and malingering. The distinction depends more on the psychology of the physician than on the behaviour of the patient. At one extreme is the conception that all malingering is due to constitutional inadequacy and must be excused under the heading of psychopathy; while others consider that amnesia is *little removed from conscious motivation.* The "shell shock" controversy of the last war is being renewed with different terminology. D. N. Parfitt and C. M. Carlyle-Gall, at the annual meeting of the Royal Medico-Psychological Association on July 20, gave a paper, based on 40 RAF ground-staff cases, which suggested that in these patients the amnesia was never far from conscious levels and was cured by simple persuasion. Doubtless many such cases are met with in the Services, where emotional stress is naturally greater than in peacetime. But because a hysterical symptom can be removed by persuasion and because we understand its motivation, are we to conclude that the patient is virtually a malingerer? And does this apply equally to other hysterical symptoms such as paralyses and anæsthesias? Hysterics are suggestible and this determines the onset of their symptoms as well as their cure. The "normal" person cannot become anæsthetic or amnesic simply by wanting to: his personality prevents it. If the hysterical patient can develop psychogenic paralysis of memory or any other function, is not this the proof that he should not be judged by normal standards of behaviour?

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[1] Principles of Canteen Inspection. War-time Nutrition Bulletin, No. 25, March, 1943.

VACUUM-DRIED HUMAN SERA IN INFECTIOUS DISEASES

DRIED serum and plasma are being widely used for transfusions, but not much has been heard of their employment in infectious disease, though for eight years McGuinness, Stokes and Armstrong[1] have used vacuum-dried human sera for specific prevention and treatment of measles, scarlet fever, whooping-cough, mumps and chicken-pox. For this purpose dried human serum has many advantages. The serum keeps well, and when prepared by the newer technique gives as good results as the fresh material. A supply can be kept at full potency against epidemic time. It can be given intravenously and by other routes without causing reactions, and it is as safe as ordinary serum. It can be administered in much larger doses with less bulk—thus, the dried product from 20 c.cm. of serum can be re-dissolved in 8 c.cm. of water—and this is particularly useful where intramuscular injection is adopted, as in measles prophylaxis. Hyperimmune serum can be used in the treatment and prophylaxis of whooping-cough. Convalescent serum has been extensively used in measles prophylaxis, but, since true convalescent serum is scarce owing to the early age at which the disease is contracted, serum from healthy young adults has been given instead. The disadvantages of adult serum are its low potency, necessitating large doses (10 c.cm. under three years; 15 c.cm. under four years; 20 c.cm. under five years), and that it rarely ensures prevention and secures attenuation in only a proportion of cases. When the serum is really required, as at the beginning of an epidemic, dried serum, with its maintained potency and diminished bulk, is likely to be much more efficient than the ordinary serum kept in reserve. McGuinness and his colleagues have obtained good results in the prophylaxis of measles. In the prophylaxis of scarlet fever the case-incidence was only 2·6%, using serum from Dick-negative subjects, while a good response to treatment was obtained in 76% of scarlet-fever cases given 30–120 c.cm. of serum intravenously. With whooping-cough they have used dried hyperimmune serum, prepared from adults who had the disease in childhood and have received repeated injections of pertussis vaccine. The agglutination titre of such sera varies from 1 in 1280 to 1 in 5120, whereas that of the ordinary convalescent is in the region of 1 in 300. When used prophylactically in 106 young children with intimate contact, prevention was secured in 67%, while typical pertussis developed in 10·5%. Over a wider range of ages, 78% were protected and only 6·1% took the typical disease, the remainder showing varying degrees of attenuation. Good results were obtained when the hyperimmune serum was used for treatment of pertussis; out of 315 cases only 5 (1·5%) died.

In mumps and chicken-pox convalescent serum has yet to prove its value. During the war the giving of blood by volunteers has become a commonplace. As drying plants get going, volunteers will probably be asked to produce hyperimmune serum. The horse has to do it in the preparation of diphtheria and tetanus antitoxin; why should not humans do it for those peculiarly human diseases in which no animal can help?

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uinness, A. C., Stokes, J. and Armstrong, J. G. *Amer. J. Sci.* June, 1943, p. 826.

A GENTLEMEN'S AGREEMENT

Lord Amulree's researches in the Royal Library at Windsor reveal the brighter side of eighteenth-century warfare. The convention he describes on p. 234 anticipated by more than a century the first international red-cross convention for the protection of prisoners and the sick and wounded, which was signed at Geneva in 1864. Nor was it the first. For many years a slowly growing humanity had been replacing the barbarism that so often led to massacre and neglect. At the siege of Tournai in 1581 the opposing forces agreed on a policy of mercy: and previously, at the siege of Metz in 1552, a high standard had been set by the French. Inside this city the medical arrangements were in charge of Ambroise Paré, and when the Emperor Charles V raised the siege his sick and wounded were faithfully tended, and safe conduct and transport were offered to messengers who came to take disabled prisoners back to their own lines. To us today, accustomed to the doctrine of total war, the generous terms of the Frankfurt commanders make strange reading. We are astonished at their latitude, although someone may recall that Sterne's "Yorick" made his *Sentimental Journey through France* at a time when that country was at war with his own. It would be difficult to go to Germany today in like forgetfulness. Lord Amulree points out that in those days civilians were considered neutral, and that the medical personnel attending the sick and wounded [illegible] civilians. This conception of the [illegible] of medicine is embodied and preserved in the Red Cross, but in a world where civilians more and more approximate to combatants its development and growth leave much to be desired. It is hardly surprising that the medical officer on either side should usually feel himself to be part of the war effort of his country: the Americans, indeed, frankly term their medical personnel "medical soldiers." Nevertheless the medicine that recognises no frontiers between human beings represents an ideal that must eventually prevail; those who believe in it will have unparalleled opportunities in the world after the war. And though the gentleman as a person of rank may be out-moded, we have to see that the courtesies of the eighteenth century become common form in the Century of the Common Man.

INHIBITION OF SULPHONAMIDES BY LOCAL ANÆSTHETICS

COMPOUND fractures and other wounds are now extensively treated by the local application of sulphonamides, and some are now operated on under local anæsthesia, the most common preparation used being procaine. Each of these procedures is excellent in itself, but (as has previously been pointed out in these columns) there are objections to combining them in the treatment of one and the same case. As Woods originally showed, the bacteriostatic action of sulphonamide compounds is completely neutralised by small amounts of *p*-aminobenzoic acid, and by other substances which contain this group. Procaine is diethylamino-ethyl-*p*-aminobenzoate and can neutralise sulphanilamide in the same way as the parent substance does. This has [illegible] shown by bacteriostatic tests in vitro and in the treatment of mouse infections by Spink and Jermsta[1] and by Keltch and others,[2] and has recently been verified by Casten, Fried and Hallman[3] in experimental wounds of rabbits. The wounds were infected with *Staphylococcus aureus*, and in the absence of treatment abscesses developed in every animal. If sulphathiazole was

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1. Spink, W. W. and Jermsta, J. *Proc. Soc. exp. Biol. N.Y.* 1941, 47, 395.
2. Keltch, A. K., Baker, L. A., Krahl, M. E. and Clowes, G. H. A. *Ibid*, 1941, 47, 533.
3. Casten, D., Fried, J. J. and Hallman, F. A. *Surg. Gynec. Obstet.* 1943, 76, 726.

inserted at the same time as the infecting organism, 60% of the wounds remained free from infection, and in the other animals the infection was much lighter than in the controls. If, however, the walls of the wound were infiltrated with procaine, the therapeutic action of the sulphathiazole was abolished and all wounds became infected. It is possible that procaine in human wounds would not inhibit the sulphonamide quite so decisively, since de Waal, Kanaar and McNaughton [4] did not observe any ill effects in three patients; but these cases are too few to carry much weight and it is better to be on the safe side and avoid this sequence whenever possible. Avoidance is the easier because the neutralisation of sulphonamides is effected not by *all* local anæsthetics but only by those which contain the *p*-aminobenzoate group, which is not an essential for the production of analgesia. Thus de Waal and his colleagues point out that procaine, 'Larocaine,' 'Tutocaine,' 'Butyn,' 'Anæsthesin' and 'Orthoform' contain this group and neutralise sulphonamides, whereas cocaine, tropacocaine, eucaine, 'Stovaine,' 'Nupercaine,' 'Phenocaine,' 'Pantocaine,' 'Psicaine,' 'Eccaine,' 'Elypin,' 'Apothesine,' 'Diothane' and 'Metycaine' have a different chemical constitution and are harmless in this respect. In wounds which are subsequently to receive sulphonamides, the use of one of these latter substances seems to offer a simple and rational solution of the difficulty.

HEAD WOUNDS IN THE MIDDLE EAST

IN his paper on our opening pages Ascroft reports that of 516 patients with head wounds of varying severity due to missiles incurred in the Middle East campaign, only 9% died. This is a sound tribute to the surgical treatment, but even more impressive is the fact that of those who survived no less than 310 (71%) returned to duty. This group included 124 cases of major injury with penetration of the dura. Doubtless the splendid physical condition and high morale of these men of the Eighth Army before their injury contributed to the results, but the methods of surgical treatment and the common-sense psychotherapy applied during convalescence were just as important. The technical details should be studied by every surgeon who may be called on to deal with head wounds in the forward areas, where segregation of cases for specialists has proved impracticable. The experience in this series confirms that of Cushing in the last war in showing that an early but inadequate operation in the forward area is usually more dangerous than one delayed until it can be done in more convenient surroundings [illegible] ocoagula- [illegible] Cases of [illegible] will have [illegible] most other cases the problem is one of transport, and here aircraft have been an immense help. Ascroft says that, if there is a reasonable prospect of transport to a base hospital within 48–72 hours of the injury, it is better to limit surgery in the forward area to cutting the hair round the wound, dusting the wound liberally with sulphanilamide powder, and fixing the first field dressing securely in position. He pleads for adequate entries on the Field Medical Card and the Head Injury Card, because these records may supply invaluable information in assessing subsequent developments. If there is likely to be a longer delay in getting the patient back to the base hospital, he [illegible] entails [illegible] is and [illegible], easily [illegible] emorrhage, and leaving the wound open. In his section on deliberate treatment at the base Ascroft describes the procedure from the arrival of the convoy. The immediate examination aims chiefly at assessing, first, the state of shock, to enable the necessary treatment to be instituted *at once*; and secondly, the state of consciousness, which was found the most useful index for establishing priority of treatment among a number of serious cases. The next step—even before the patient is sent to the ward—is a careful X-ray examination, indispensable in these cases. As a rule devitalised scalp was excised more widely than is necessary in civilian accidents because in these deep missile wounds layers are often more extensively destroyed than the superficial ones. The loose fragments of depressed and penetrating fractures were removed piecemeal rather than en-bloc (as in an osteoplastic flap). If the dura had not been penetrated, it was not opened at operation unless there was evidence of cerebral compression, as by a clot. If the dura had been penetrated, it was rarely necessary to enlarge the opening, but loose tags of dura were excised, and if the bone fragments was gently sucked out, thus removing damaged brain, clot and some of the foreign bodies. No attempt was made to remove deep seated metallic fragments, but loose fragments of bone driven into the brain were removed because they were found to be potent factors in the development of brain abscess, in contrast to the metal fragments which had presumably been sterilised by their own heat. The dura was never closed for fear of incarcerating infected material in the brain. Clean wounds of the scalp were closed with a layer of stitches in the galea and one layer in the skin, a corrugated rubber drain being led out through a stab wound. Frankly septic wounds were left open. Ascroft recommends morphine for allaying the alarm and restlessness of battle casualties, and no untoward effects were noticed, there is a well-founded prejudice against the use of morphine for civilian head injuries. For violent restlessness during transport or in the postoperative period intravenous paraldehyde proved safe and effective. At operation, intravenous anæsthesia ('Pentothal') was soon found to be the method of choice rather than local infiltration or inhalation anæsthesia. The patients were encouraged to get up and about and help in the ward work and recreations as soon as they felt like it. This is occupational therapy at its best, and there can be no doubt that the attitude of doctors, nurses and fellow-patients did much to lessen the impression of the gravity of a "brain wound" for these men. These principles could usefully find a wider application in civil and industrial accidents at home. Another point which emerges clearly from this study is the rôle of the specialist in battle surgery. With head wounds the War Office has struck a balance [illegible] on the one [illegible] the other; a[illegible] [illegible]eir policy been more firmly established.

THE annual general meeting of the British Medical Association will be held on Wednesday, Sept. 22, at 12.30 PM at BMA House, Tavistock Square, London, W.C.1. The meeting of the Representative Body begins on the previous day.

"The shortage of practising midwives to which special reference was made in last year's report still exists and causes anxiety," writes Sir Comyns Berkeley in this year's report on the work of the CMB. Nearly a thousand more pupil-midwives began training during this year than last and the Roll of Midwives contained 1450 more names (total 67,112) on 31.iii.43 than on 31.iii.42. But the situation will only be [illegible] administer gas-and-air analgesia. The report offers thanks to the midwives who are maintaining the high tradition of their profession, at present in the face of difficulties and dangers.

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4. de Waal, H. L., Kanaar, A. C. and McNaughton, J. *Lancet*, 1942, ii, 724.

Special Articles

SIR JOHN PRINGLE AND THE FRANKFURT CONVENTION

A BICENTENARY

LORD AMULREE, M D, M R C P

IN 1742, on the outbreak of the war of the Austrian Succession, 16,000 English troops landed in the Low Countries, under the command of the Earl of Stair, to fight on behalf of the Empress Maria Teresa against the French. Lord Stair established his headquarters at Ghent, and a hospital was opened in the town staffed by a director, a surgeon, a physician, an apothecary, six mates and a matron. The physician was Sir John Pringle, the surgeon-general of the English army and personal physician to the commander-in-chief; for his work Pringle was paid 20*s.* a day with the prospect of retiring on half-pay for life.

After a year's desultory campaigning, the French and allied armies (the English had been joined by contingents of Hanoverian and Austrian troops) met near the River Main on June 27, 1743, and the battle of Dettingen was fought. The allies won the battle but retired quickly to their base at Hanau on the Main, leaving the French in possession of the field and of 600 out of their 1300 wounded.

Shortly before the battle, however, the two commanders, on the initiative of Lord Stair, had come to an agreement for the proper care of their prisoners and wounded, and from the way in which Pringle refers to this agreement in the introduction to his *Observations on the Diseases of the Army,* it seems likely that he was concerned in making it:

> "Till then it had been unusual for the security of the sick (when the enemy was near) to remove them a great way from the camp, where many were actually lost before they came under the care of the physician, but the Earl of Stair, my illustrious patron, being sensible of this evil, when the Army was encamped at Aschaffenbourg, proposed to the Duc de Noailles (of whose humanity he was well assured) that the hospitals on both sides should be considered as sanctuaries for the sick and mutually protected. This was readily agreed to by the French General who took the first opportunity to show a proper regard to his engagement. For when, after the battle of Dettingen, a hospital was at Feckenheim, a village on the main at a distance from the camp, the Duc de Noailles, having occasion to send a Detachment to another village upon the opposite bank and apprehending that this might alarm the sick, he sent to acquaint them that, as he knew the British hospital was there, he had given express orders to his troops not to disturb them. This agreement was strictly observed on both sides during the campaign though it has been since neglected, yet it is still hoped that on future occasions the contending parties will make it a precedent."

This statement is confirmed by a letter which the Duc de Noailles, the French commander, wrote to Lord Stair on June 30, three days after the battle.

> "Sir,—I have sent M. de Silhouette, Commissioner of War attached personally to myself, to you to treat provisionally with whom you may please to nominate concerning the exchange and ransom of prisoners of war and the care and safety of sick and wounded. I have already ordered that care shall be given to the sick left at Aschaffenbourg and that, according to the Convention which you have proposed to me, they shall not be retained as prisoners of war. I have gathered here almost 400 wounded who have been kept apart and who are being cared for as our own. As soon as the first arrangements have been made between the two sides we will be able to sign a treaty on the usual lines so that one will know on what one may rely, and, in the event of fighting, one can act as brave and honest men who serve out of loyalty to their Prince and their country without that hatred and cruelty which must be left to the barbarians."

Shortly after, on July 18, 1743, a convention was signed at Frankfurt by representatives of the English, French and Austrian commanders dealing with the position of prisoners-of-war and wounded. A copy of this convention is in the Royal Library at Windsor and I must acknowledge my thanks for permission to quote from it. The convention is interesting for the humanitarian principles for the treatment of prisoners and wounded which it lays down, and it crystallises into words the agreement to which both Pringle and de Noailles refer.

It provides that all prisoners, with no exception, shall [illegible] or ransomed, and—that there [illegible] out the exchange or ransom—[illegible] of the opposing armies are set out with their monetary value placed against each. A simple formula for calculating the rate of exchange is also given. It is agreed that a nominal roll of prisoners shall be kept and that each army shall promptly inform the other of what it owes for the maintenance of prisoners, the note of this indebtedness to be conveyed by one of the returning prisoners to his own commanding officer. The prisoners shall receive the same ration of bread as the serving troops, and an account of the cost of this is to be kept so that at the exchange any excess of cost of one side over the other can be paid at a fixed rate. Prisoners shall be given clean straw which shall be changed weekly. All prisoners may give information of their capture, and no prisoner shall be forced to enlist in the enemy forces; quartermasters shall be allowed to forage for food provided they do not approach nearer than two leagues to any fortified place or to the respective armies.

Then follow two articles which are of particular interest as they deal with the care of the wounded and sick.

> *Article 41.*—"That care will be taken of the wounded of both sides; that their medicine and food will be paid for; that the cost will be repaid by both sides; that it will be permitted to send to them surgeons and their servants under passports from the Generals commanding; that those who have been taken prisoner as well as those who have not shall be sent back under the protection and safe-conduct of the Generals, either by land or by water as is most convenient and suitable from the places where they are on condition that all those who have been made prisoners shall not serve until they have been exchanged."
>
> *Article 42.*—"That the sick and wounded on either side shall not be made prisoners; that they shall remain in safety in the hospitals where each of the belligerent and auxiliary parties may leave a guard which, together with the sick, shall be sent home under the passport of the General commanding by the shortest route and without being harrassed or arrested. Likewise all commissaries or muster-masters, chaplains, physicians, surgeons, apothecaries, waiters, nurses, servants or other persons appropriate to the care of the sick shall not be made prisoners and shall be sent back in the same manner."

As the convention was designed to improve the lot of sick and wounded as well as of prisoners, it is natural that some protection should be afforded to those upon whose care their welfare depends—i.e., doctors and other medical staff. But a subsequent article gives a further list of those persons who, if captured, shall not be treated as prisoners of war—namely, "the Provost-Marshal, Lieutenants and other Officers of the Military Police, the auditor, clerks and other lay officials in the army, chaplains, ministers, postmasters, their clerks, couriers, postillions, physicians, surgeons, apothecaries, directors and other hospital officers, grooms, major-domos, valets de chambre and other servants." This article follows immediately upon those dealing with the amount of ransom which can be obtained for men of various ranks in both armies.

In those days warfare was a matter to be decided between two armies of professional soldiers; although the civil population might, and indeed often did, suffer in the course of military operations, war itself was not directed at them. It may well be that the privilege which these protected persons appear to have received was in itself a recognition of their essentially civilian status and was not intended to serve as any recognition of their professional position. This indeed is comparable with the situation under the present Red Cross convention by which medical staff and others are protected because of their importance to the wounded, and not from any inherent privilege which their professional status may possess.

THE Hospital Saturday Fund has decided to extend its benefits by granting hospital vouchers for cases in maternity hospitals or in the maternity wards of voluntary hospitals. Domiciliary or nursing-home treatment for these cases is not included in the new scheme.

SCHOOL CANTEENS

THE communal feeding of elementary-school children has been officially sanctioned since 1906. The Acts of that year and of 1921 were concerned more especially with necessitous children, though even before the last war the principle had been extended to include provision for children who, for various reasons, might be likely to benefit from a school meal. As time went on the regulations empowered an education authority to supply meals for payment to any child whose parents wished it. School meals were, however, little taken advantage of; in the years between the wars there were few days on which more than 3% of the children were receiving a midday meal at school. At least two-thirds of these were necessitous cases being supplied with free meals, and more than a third were concentrated in twenty-four large industrial centres.

FEEDING THE EVACUEE

Mr. F. Le Gros Clark has made a special study of communal feeding, and from time to time, in association with officers of the Board of Education, has issued well-informed reports[1] tracing developments since the war began. Evacuation of children at once raised the problem in an acute form. In July, 1938, the Anderson report of the Home Department Committee on Evacuation had taken the view that private householders could [illegible]

[illegible] expanded further. Definite proposals were put forward that midday meals should be provided in order to relieve householders, it being assumed that the advantage of being rid of the children at midday would be sufficient to induce the householder to pay for the meals out of the billeting allowance. When the time came to put it into practice, this proposal did not meet with the expected response, and, as a whole, the early efforts at communal feeding of evacuees were not strikingly successful. The finding of premises in which to run canteens was one difficulty; unwillingness on the part of a good many householders to give up 15–20% of the billeting allowance for the provision of one meal a day was another. The position varied considerably in different parts of the country. The Home Counties received the largest per- [illegible]

[illegible] sations available. Such diverse districts as Bedford, Carlisle, Darwen and Windsor reported after careful [illegible] s unnecessary. [illegible] d in the larger [illegible] een evacuated, and partly because of improvement in the financial circumstances of the family. Dr. St. Clair Stockwell, school medical officer for Leeds, drew attention in his report of 1940 to the relative failure of free feeding schemes as compared with a canteen where no distinction was made, and where the atmosphere of cleanliness and the presence of teachers at the meals had helped in improving the tone of the service.

EXTENSION TO ALL CHILDREN

The first real stimulus came with the issue by the Board of Education in July, 1940, of Circular 1520. By its provisions school feeding became a recognised part of war economy, and the distinction between native children and evacuees was swept away. Education authorities were asked to consider the desirability of feeding not only "children whose needs are not fully met by the normal provision of food at their homes," but the ordinary child population, and to encourage parents to take advantage of the facilities offered. At the same time a substantial increase of grant was promised, including an understanding that no authority was to receive less than a 50% grant. All children were henceforth to be fed at school if the parents or foster parents desired it, and all meal centres were to be [illegible] thus removing the stigma [illegible] minds of many parents wi [illegible]

From this time the cant [illegible] but steadily to the end of 19 [illegible] from month to month, but very uneven in different parts of the country, and as late as the spring of 1942 forty-five authorities had taken no steps to put a feeding scheme into operation, a large majority of these being towns of no great size scattered mainly over the southern half of England and South Wales.

Naturally the arrangements for school feeding were affected by the movement of children from certain areas, especially the sea-coast towns, as well as by the bombing of industrial centres and the absorption of women into war work. In London the provision of school meals was suspended in the first months of the war, and only slight progress in restoring them had been made by September, 1940, when the serious bombing ordeal began. Fresh emigration of children into the country left London with a school population of about 100,000 in the early part of 1941—rather less than a quarter of its prewar numbers. In February of that year, some 2400 were being provided with meals. By the end of the year meal centres were being used not only as dining places but also as kitchens from which food could be despatched to other schools, and by the late spring of 1942 London was able to provide for more than 20% of its average school attendance.

CANTEENS AS AIDS TO NUTRITION

Both the Board of Education and the Ministry of Food had decided that school meals were a proper part of any rational war economy, and, as Le Gros Clark puts it, "Relations between the two departments have had the result of deepening this conviction into a dogma." The effect of this cooperation was seen in the terms of Circular 1567, issued in October, 1941. The rate of grant on the provision of milk was then raised to 100%, and the minimum grant on meals was raised from 50 to 70%, with a general rise of 10% on the grants then in force. To impress on authorities the importance of the feeding problem school canteens were brought within the priority arrangements for distributing certain unrationed foods. From this time school canteens entered on a new phase of development. The Board of Education was aiming not merely at relieving women engaged on war-work but also at ensuring to school-children a measure of differential rationing. Nor has it stopped there. In Circular 1629, addressed to local education authorities in May of this year, the President of the Board asks fo [illegible]

[illegible]

F [illegible]

W [illegible]

of [illegible]

an [illegible]

Th [illegible]

co [illegible]

standard huts, and the equipment, both light and heavy, [illegible] al need. New premises [illegible] than kitchens, and new [illegible] therefore be provided [illegible] e arrangements can be [illegible] an existing hall or classroom. When increased numbers make extra accommodation essential, prefabricated huts will be approved for dining purposes.

The object of the school meals service is to secure and maintain a high standa [illegible] children. In this latest [illegible] says: "To serve their [illegible] good and ample; good [illegible] allowances of protein foods and fats, plenty of green vegetables, &c., which are relatively costly, and adequate in quantity." Experience has shown that regular demand depends on the quality of the meals, and there is a general desire among authorities to reach the [illegible] e Board. Evidently school [illegible] d they will play an important [illegible] building up a sound physique in our boys and girls.

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[1] *The School Canteen*, 1939–40, and *The School Canteen*, 1941. Price 1s. 3d. each post free. From F. Le Gros Clark, 6, East Common, Harpenden, Herts.

MEDICINE AND THE LAW

The GMC Upheld

In the same week as the House of Lords decision in the Spackman case there was another challenge to the procedure of the GMC in erasing a practitioner's name from the Medical Register. The Divisional Court upheld the council's action and no appeal seems likely. The Spackman case emphasised the two grounds of erasure—first, a conviction by a criminal court for felony and misdemeanour; and, secondly, a finding by the GMC, after due inquiry, of infamous conduct in a professional respect. In Thomson *v.* General Medical Council the first ground existed. The mere production of a certified copy of the conviction sufficed to give the GMC full jurisdiction to erase the name. The practitioner could not ask the council to say that he was wrongly convicted.

Dr. George Macdonald Thomson, formerly practising at Salisbury and now serving as a private in the Army, was convicted at Kingston (Surrey) of aiding and abetting his wife in making a false declaration with regard to the birth of a child. The child had been registered as born to him and his wife when it was in fact his child by another woman. When the matter came before the GMC in June, 1942, Dr. Thomson did not attend; the erasure of his name was directed. His application (four months later) for reinstatement was refused. He now asked the Divisional Court to order the GMC to restore his name because the inquiry had not been properly conducted, the council's conclusion had been reached on inadmissible and untrue evidence, and the proceedings were contrary to natural justice. His counsel told the Divisional Court that Dr. Thomson did not regard the false registration as a serious offence; it concerned nobody outside his family circle; it was not an offence against society. The Lord Chief Justice intervened to observe that perjury is a grave crime which shakes the very foundations of justice. False registration of a birth, marriage or death "may draw all sorts of rights and interests into inexplicable confusion."

This, however, was not the crux of the case. As soon as the certified copy of the conviction was produced, the GMC could unquestionably proceed to direct the erasure of Dr. Thomson's name. But, in the final stage of its deliberation, the tribunal had inquired what was known about him and had heard the evidence of a detective sergeant. This course is usual in criminal courts, after conviction and before sentence; it enables the judge to decide how to deal with the accused; the information made available may tell in favour of leniency. Earlier this year the Court of Criminal Appeal ruled that it is not proper to encourage evidence given in this way by a police officer to rove over the whole of a man's career. There may be matters which cannot be strictly proved and which the accused may vigorously deny. The criminal courts, however, have not abandoned the practice of asking for information within the permitted scope. The point taken on behalf of Dr. Thomson was, in effect, that the GMC was following the old practice of the criminal courts, the course to which the Court of Criminal Appeal has now set a limit. The Divisional Court, however, has found nothing to justify intervention. What the detective sergeant said to the GMC was in substance what had been said in the criminal court originally. Dr. Thomson, said the Lord Chief Justice, had apparently not considered it worth while to question it at the time. Lord Caldecote could not resist the conclusion that Dr. Thomson was not in a position to contradict any part that would have made any difference to the weight of the information given by the sergeant. Those statements made before the GMC were not inadmissible; they were properly received. There was no irregularity in the proceedings which would justify the court in ordering the GMC to quash its decision.

The Lord Chief Justice added a few sentences about the GMC's statutory authority as a domestic tribunal entrusted with the maintenance of professional standards. "It is the Council's duty," he said, "to discharge those functions and it is not for the court to act as a court of appeal either on the facts or on the decision to erase a [illegible] if the Council thinks the facts justify that result." [illegible] Thomson's application was accordingly dismissed [illegible] costs.

In England Now

A Running Commentary by Peripatetic Correspondents

With the BNAF, 1500 hours (1300 by the sun) is not the best time for writing. The heat slows down one's mental processes nearly to a standstill. All my colleagues lie in the shade of their trees, protected from the multifarious forms of insect life by mosquito nets draped from olive branches, and there they doze or read. The Church of England does show signs of activity—the padre is paddling in his canvas bath. "I hear lake water lapping with low sounds by the shore." He is obviously enjoying himself like a baby splashing in the shallow water of a sunny beach on a drowsy summer day. The Roman Catholic padre and his brother from the Church of Scotland have been lulled to sleep by the drone of the cicalas. A gentle breeze makes life reasonably tolerable, but if the wind gets up we shall suffocate in clouds of dust driven from the surrounding tracks graced by such names as Baker St., Harley St., Euston Rd., and the like.

One curious result of living in the open air is the disappearance of my [illegible] and cucumber I n[illegible] vast dollops of raw [illegible]. The acid dyspepsia which punctuated my existence in civil life is now but a memory; I wouldn't know that I had a stomach. No doubt I eat twice as much as the average civilian at home, and in particular I consume large amounts of butter (or margarine) and cheese. On the other hand, we get less fat in prepared foods—cake, pastry and so on—owing to the cook's lack of imagination and initiative. Every week we get two or three bars of chocolate, but in this heat my appetite for chocolate is nothing like what it was on cold days at home. For one thing, chocolate increases thirst, so much so that I feel distinctly uncomfortable for a few minutes after eating a piece. Once it is issued our chocolate must be eaten right away or precautions taken to insulate it against the heat. Otherwise it soon starts to trickle down one's book or equipment. Another godsend is freedom from neurotic symptoms. At home I used to suffer from functional dyspnœa and the beastly general exhaustion which it produces after a few days. (How keenly interested I was in Dr. Doris Baker's article on the complaint a few years back.) When I have been discussing the syndrome in outpatients I have often seen students eyeing me curiously as I set out the symptoms in suspicious detail. By way of a change I used to have exacerbations of globus hystericus. Since I joined the Army I haven't had a trace of these disorders. I wouldn't give the impression that life is now one long rejoicing in radiant health and mental tranquility. I still have my bouts of exasperation and frustration, but there is never any doubt about their cause, and that knowledge brings reassurance. I now present, too, a gratifyingly fierce appearance in my moments of anger, for my hair has been clipped short all over, my face is tanned, and my sclerotics, by contrast, have a startling whiteness when untinged by mepacrine; my Army glasses complete an ensemble which would pass muster at a Nuremburg festival.

* * *

In conversation with the superintendent of a NHI pricing bureau I incautiously mentioned prescribing. The bureau deals with prescriptions by the million, and the superintendent only sees those which defeat the ingenuity of the pricers, so his views of prescribers' habits were a little coloured. What prescriptions some of them were! Bad writing explained some of the difficulties—for example, Tab. 'Multivite' was interpreted by the chemist as Tab. Phenobarbitone: there is no record of the patient's reactions. Nor do we hear what happened to the patient ordered Malt Extract who received Mist. Alb. ℥x. Ung. Sulph. became Mag. Sulph—a perhaps excusable error, though the directions the doctor gave the patient must have been hard to carry out. The chemist must have scratched his head a long time over 'Metatone' ℥vi before he turned it into Linctus Codeinæ NF. One prescriber had the habit of contracting Extract of Malt with Cod-liver Oil to the mystic formula EOMCLO, and on one occasion this produced zinc ointment. Mist. Nuc. Vom. Acid ℥xii was read by the chemist as Pulv. Bismuth Co. NF. But the prize in this section must go to the doctor who signed his name in the body of the [illegible] with the result [illegible] theter lubricant. [illegible] rdered from the [illegible] of people don't [illegible] on Economy in Drugs. There were, too, instances of aberrations or pure errors excusable perhaps in the over-worked GP, though when a cough mixture script is sent for pricing with the normal infusion replaced by Tinct. Nuc. Vom. ad ℥viii, one can only be glad that the doctor did not dispense himself; but of course he would have noticed the error when he came to his dispensary counter. One prescription puzzled the superintendent mightily: it read ℞ Ung. Hydrag. mitte ℥vi. Sig. ʒi t.i.d., a.c.

Finally, prescriptions are still coming in containing quinine in such combination that it is clearly not prescribed for malaria. There must be some doctors who never read any medical journals whatsoever.

* * *

[illegible] ee only two of the Plays at [illegible] —too heavily cut, I thought [illegible] Mr. Baliol Holloway, having neither the body nor the mind of Falstaff, could hardly be expected to be at his best, and Mr. Abraham Sofaer as Ford struck al[illegible] lf-pity; I prefer my Ford[illegible] a high-pitched frenzy, a [illegible] Mistress Ford and Mistres[illegible] means all, the fun to be [illegible] Had I a penny for every time I have read *Othello* it would be a great help towards meeting the income-tax but this was the first time I had seen it played. What an engrossing play it is. And what a build-up—even without the "Willow" scene, also rashly cut in this production. How, I wonder, does Will avoid giving us a feeling of anticlimax after Desdemona's death? This poor lady was strangled instead of being smothered and one felt that a little timely artificial respiration by Emilia might have worked wonders. Here Mr. Holloway as Iago was much more at his ease, and Mr. Sofaer, had he been better produced, might have made a great instead of merely a sound job of Othello. He has the voice and the presence but when he ordered them to silence that Dreadful bell he could and should have been much more awe-inspiring. He ought to hear my partner deliver *that line when the telephone rings.*

* * *

If this should meet the eye of any youth, who future days has pawned for present need, instant and urgent at his country's cry, *who left the learning of his chosen* art, smelting the jewelled sword, his heart's desire, into some primal, crude, compelling blade, yet would knapsack a memento of his love, remember then that War though thief of youth pays for his service with no common coin—no common task is yours—remember Captain Thomas Sydenham.

He went to Oxford in his eighteenth year in the spring of '42 and left to join up a few months later. He served in several campaigns and was wounded. He lost two brothers in different theatres of war and his mother was killed by enemy action. He was 39 before he took half of the Conjoint—the LRCP—and as a result of his interrupted studies his Latin was such that he got a friend to translate the labours of his pen and fruits of his mind.

Yet, because much of his study had been made in the saddle, he saw further than others; because he bedded often on her earth, he gazed more truly into Nature's eyes; because death and anguish compassed him very nearly, he had a wider compassion; because in times of peril he acted on his own reckoning, he was not too nice in following tradition—in fact he made tradition and became one of the fathers of that many-sired affair, modern medicine. May the turmoils of this time throw up his like.

* * *

I was waiting in the station the other night after a spot of leave, studying the *train indicator board hopefully.* All around was the noise and bustle found at most stations these days, but beside me were two silent men relying on each other for support. The silence persisted for quite a time, while they swayed gently, concentrating

Continued at foot of opposite column

Public Health

AN EMERGENCY METHOD FOR THE STERILISATION OF WATER

ARNOLD RENSHAW, M D LOND, D P H
DIRECTOR OF THE LABORATORY OF APPLIED PATHOLOGY AND PREVENTIVE MEDICINE, MANCHESTER

IODINE is an outstandingly effective agent for sterilising potable water, and possesses certain advantages which deserve attention just now, when the risk of water-borne infection is abnormally high. I have found that when 1 ml. of typhoid culture is mixed with 100 ml. of ordinary tap water to which an aqueous solution of iodine and potassium iodide (Lugol's solution) had been *added to give a proportion of 1 part of free iodine in* 20,000 parts of the water, complete sterilisation was effected within ten minutes. I then went on to test the action of iodine against *Bact. coli*, *B. typhosus*, *B. paratyphosus A* and *B*, *B. dysenteriæ* (Flexner, Shiga, and Gaertner), and *Vibr. choleræ*. In each case, 1 ml. of a fresh 24 to 48 hour broth culture was added to [illegible] iodine and potassium [illegible] s, then 1 ml. plated on [illegible] *incubation (table I)*

TABLE I—ACTION OF IODINE IN VARIOUS DILUTIONS

Number of Colonies per 100 ml. of Iodine treated Water

Organism	*Iodine used in dilution of*					*Control:* No iodine
	1:13,333	1:20,000	1:40,000	1:80,000	1:200,000	
[illegible]	[illegible]	[illegible]	6000	100	1 mill.	Mill. 22–59
[illegible]	[illegible]	[illegible]	< 100	< 200	49,500	5–108
[illegible]	[illegible]	[illegible]	< 100			9–15
[illegible]	[illegible]	[illegible]	< 100	200		0·6–11
[illegible]	[illegible]	[illegible]	sterile	< 100		11–84
[illegible]	[illegible]	[illegible]	sterile	sterile	100	18–73
[illegible]	[illegible]	[illegible]	sterile	211,000		24–126
[illegible]	[illegible]	[illegible]	sterile	sterile	6000	0·5–28
Chol. (aq. dest.)	..	sterile	sterile	sterile	< 100	4·4

(Where an antiseptic dilution showed no growth on the plate inoculated with 1 ml., but growth in 50 ml., the count is regarded as < 100). Mill. = millions.

In these tests the rate of infectivity of the water was very high; in very few cases were there less than 500,000 organisms per 100 ml., and the number rose in some experiments to as much as 100 million or even higher. The total-ammonia content of 1 ml. of the broth used was 0·98 part per 100,000—about half the total in a sewage effluent. Despite the heavy concentration of bacterial and organic pollution, however, a *1:20,000 dilution of iodine was sufficient to effect complete* [illegible] ms named, within ten [illegible] Where distilled water [illegible] water, an even greater dilution was possible. If therefore the organic pollution effected by 1 ml. of broth had been in the order of 0·1 ml., it is possible that even more effective ranges would have been recorded; but the degree of organic pollution effected by 1 ml. of broth can be taken to represent fairly well the degree

Continued from previous column

on the battle with gravity, then one suddenly remarked, "You'll no see a Glesca man in a lavatory on a Setarday nicht wi' a bottle o' milk." There was a longish pause while his chum thought it over. "Naw"—he was in complete agreement. I was thinking it over later. The first man might have been complaining about the lack [illegible] directors. *It could* [illegible] being taken to task [illegible] But to me it sounded like civic pride.

* * *

Revisiting a country house after an interval of twenty years I was surprised to find how it had shrunk. The drive had lost at least half its length and the meadows on either side of it (now under corn) had dwindled proportionately. The once spacious entrance hall is now not much more than a vestibule, the Big drawing room is quite little and the Little drawing room tiny. The only thing that had not shrunk was the welcome I received from its inhabitants. That, at least, was as large as ever.

of pollution which might be present in waters drunk by troops and others under circumstances requiring sterilisation of water. This is important, since much of the effective iodine is absorbed by the organic constituents of polluted water, leaving a much lesser amount for bactericidal activity.

To compare the relative merits of chlorine and iodine, 1 ml. of a recent 48-hour broth culture of *V. choleræ* was added to distilled water, which with the added antiseptic totalled 100 ml. The following dilutions of iodine and bleach solution were tested (table II) and allowed to act for ten minutes, after which 1 ml. quantities were plated out on to agar, and 50 ml. quantities were poured into double strength peptone water. The strength of chlorine was estimated immediately before the experiment, colorimetrically and by titration with sodium arsenite solution. The water used contained 4,372,000 vibrios per 100 ml.

TABLE II—ACTION OF IODINE AND CHLORINE COMPARED

Dilution	Iodine	Chlorine	Dilution	Iodine	Chlorine
1:20,000	sterile	sterile	1:160,000	< 100*	sterile
1:40,000	sterile	sterile	1:400,000	600	17,000
1:80,000	sterile	sterile			

* 1 ml. sterile; 50 ml. positive.

The volume of iodine solution when added to 100 ml. of water corresponding to an ultimate dilution of 1:20,000 was only 0·1 ml., as compared wth 2·5 ml., of bleach solution; so that only one twenty-fifth of the volume of iodine solution need be carried for ready and instant use as compared with bleach solution. One ml. of Lugol's iodine per litre of water usually suffices to ensure complete sterility within ten minutes. Any excess can be removed by filtration through activated charcoal. Moreover the colour of the iodine solution, when added to the water to be treated, gives the user some idea as to whether an adequate amount has been added. If the faintest yellow tinge is left at the end of ten minutes, the water can normally be regarded as freed from the contaminating organisms which have been the subject of these experiments. Moreover, unlike ordinary bleach solutions, the iodine solution keeps well. Should it be desired to make doubly sure, amounts of iodine solution can be added to the water sufficient to impart a definite yellow tinge which still persists at the expiry of ten minutes. The water may then be shaken with, or filtered through, activated charcoal which will absorb any excess of iodine. Cost is very low, in view of the results obtainable.

These experiments show that iodine possesses extremely effective action against the organisms responsible for typhoid, paratyphoid, cholera and bacillary dysentery. This antiseptic action is effective within ten minutes for the purpose of sterilising water. It should prove useful as an emergency method of sterilisation by the civilian population, by isolated units of troops, and in other circumstances where a concentrated, stable and potable antiseptic is indicated.

Infectious Disease in England and Wales

WEEK ENDED AUG. 7

Notifications.—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 1520; whooping-cough, 1614; diphtheria, 493; paratyphoid, 5; typhoid, 8; measles (excluding rubella), 1903; pneumonia (primary or influenzal), 484; puerperal pyrexia, 170; cerebrospinal fever, 34; poliomyelitis, 16; polio-encephalitis, 0; encephalitis lethargica, 1; dysentery, 122; ophthalmia neonatorum, 75. No case of cholera, plague or typhus fever was notified during the week.

Deaths.—In 126 great towns there were no deaths from enteric fever or scarlet fever, 2 (0) from measles, 8 (2) from whooping-cough, 8 (0) from diphtheria, 33 (6) from diarrhœa and enteritis under two years, and 3 (0) from influenza. The figures in parentheses are those for London itself.

The number of stillbirths notified during the week was 191 (corresponding to a rate of 32 per thousand total births), including 15 in London.

CORRIGENDUM.—In our issue of Aug. 7, p. 162, the price [illegible]ntials of *General Anæsthesia* by Macintosh and [illegible]ster was given as 16*s.* instead of 25*s.*

Letters to the Editor

TAKING THE STING OUT OF PROFLAVINE

SIR,—There is every reason why proflavine should replace the more toxic acriflavine, but a word of caution is necessary. Proflavine is available mainly as the pharmacopœial "proflavine sulphate," which is actually the acid sulphate analogous to the bisulphate of quinine. We find that a 0·1% solution of proflavine sulphate has a pH of 2·5 as measured with a glass electrode. This degree of acidity must be highly irritating and possibly damaging to delicate tissues (cf. Russell, D. and Falconer, M. *Brit. J. Surg.* 1941, 28, 472). It is easy to overcome this drawback by converting the acid salt to the normal salt at the time of dispensing. For instance, a 0·1% aqueous solution may be prepared by warming 1 gramme of proflavine sulphate and 0·25 g. of sodium bicarbonate with 40 ml. of water until dissolved, and diluting to a litre. This solution has a pH of 6·0 and should be bland.

There is no reason why neutral salts of proflavine should be unavailable. In a forthcoming issue of the *Pharmaceutical Journal* we describe not only the above solution but the preparation of several other neutral salts, including the benzoate, benzene sulphonate and salicylate, which are soluble in 60, 110 and 430 parts of cold water respectively and equal to the official salt in [illegible] powder therapy of wounds [illegible] by Mitchell and Buttle would [illegible] results if one of these neutral salts were used, not only on account of the absence of acid necrosis but also because these salts have a constant solubility, whereas the solubility of the acid sulphate (1 in 300) increases, in proportion as it is neutralised by the tissue juices, to that of the neutral sulphate, which we find is 1 in 4.

ADRIEN ALBERT.
The University, Sydney. WALTER GLEDHILL.

PULMONARY TUBERCLE IN CHILDREN

SIR,—Dr. Toussaint chides me with criticising the work of tuberculosis officers in London, and regards such criticism as based on false assumptions. The particular child referred to in his letter was a boy, a member of a tuberculous household, who was evacuated from London, and subsequently, to the best of our belief, infected 10 of his class mates and 3 of his co-billetees before his tuberculous disease was discovered. His discovery was primarily due to the acumen of the general practitioner in Sussex, but for whom he would have continued to disseminate infection. Although the boy had been evacuated for more than a year before admission to Cuckfield EMS Hospital, his pulmonary lesions were of a chronic adult type with extensive cavity formation, and I feel in no doubt that his infection was present before he left London.

Our investigations into the source of infection in evacuated tuberculous children were made possible by the close coöperation of the county health authorities for East Sussex, to whose help I am indebted. When correspondence with the appropriate authority in London was required, this was carried out for us by the county authority. Dr. Toussaint is surprised that no attempt was made to obtain the previous history of contact examination in the case under consideration. The fact is that the other children whom the boy infected came from an adjacent borough, and correspondence passed between our county authority and the MOH of that borough, and was at our disposal. I regret that correspondence did not materialise with Dr. Toussaint, otherwise we might have learnt earlier that this boy having a positive tuberculin skin test in 1933, and known at that time to be a contact case, was eventually X rayed in 1936. It is my opinion that, for the early detection of intrathoracic tuberculosis in a child, clinical examination alone is not enough; it should be supported by both X-ray and skin-test investigation.

I fully appreciate the [illegible] reception areas, during the [illegible] about evacuated children who had been in contact with phthisis before going to the country; but had such information been supplied even a few months later, so that suspected children could be kept under observation while in the country, much illness and spread of infection might have been avoided. For reception areas to have to discover these children because of the severity of their illness, and then work back to their prewar history to find a possible source of contact, has been to shut the stable door after the horse has bolted. We must all hope that mass evacuation of children will never be repeated; but should it become necessary, and if we are to profit by past experience, two lessons learned at Cuckfield are: (1) that lay billeting officers should be furnished by their MOH with a list of households that must not accept healthy children on account of the presence of a phthisical adult; (2) that reception areas should be informed of children who before evacuation have been exposed to a known risk of infection, so that their close supervision may be continued.

Dr. Toussaint, I feel, raises an important point when he says it is beyond the bounds of reasonable expectation to extend supervision to nephews, nieces and cousins, who may visit a tuberculous adult. No-one would deny that most children with intrathoracic tuberculosis are infected by members of their own household; but instances in which children are infected as a result of ascertainable contacts outside their immediate family circle arise with sufficient frequence to make it imperative to widen the scope of inquiry into possible contacts. Thereby not only will young children have a better prospect of their infection being detected early, but unsuspected adult sources of infection may be brought to light, and their capacity to spread infection be checked.

London, W.C.1. WILFRID SHELDON.

SWABBING OF CONTACTS IN DIPHTHERIA

SIR,—I also share the astonishment of "Pathologists" and Dr. Downie at the statements made in the memo

experience was anything to go by. At a large secondary school where out of 313 scholars only 30% had been immunised and where the disease first appeared, 10 carriers were discovered by swabbing the whole school. Of these carriers 8 were gravis and 2 were mitis types. Coincidently with this outbreak, diphtheria was notified in children attending a senior girls elementary school where out of 251 attending only 10% had been immunised previously. Out of this number, 5 carriers were found by mass swabbing (3 gravis, 1 intermedius and 1 mitis). The swabbing of a large number of scholars in 15 other schools uncovered six other centres after swabbing some 60% of the total school population in this region.

The following facts emerged from the investigation:—

1. Three main centres were uncovered, with five secondaries of a lesser degree.

2. No carriers were found in any infant school investigated, which contrasted with my own experience of 10 or 12 years ago when, in an infant school of 240 scholars, 22 virulent carriers were discovered by swabbing the whole school.

3. Of 2176 children examined, from whom 2304 swabs were taken in the months of November and December 1941, 27 carriers were discover [illegible]
3 were intermedius and [illegible]
the total examined. A [illegible]
and were only cleared after tonsillectomy.

4. Six carriers had been immunised previously (4 gravis, 1 [illegible]

[illegible] with TAF. (Zinsser, 3rd ed., Infection and Resistance, p. 532, mentions this phenomenon with toxin antitoxin mixtures.)

There is no doubt in my mind that the detection and isolation from school of these carriers limited the incidence of diphtheria to a considerable degree. This, combined with heavy immunisation of the remainder at a rapid rate, stamped out the epidemic before it could get a real hold. Had the carriers been left at school and immunisation alone been relied upon, the disease would

now 95% for those between 5–15 years and 80% for those aged 1–5 years), diphtheria has disappeared from this district; during the last 18 months one case only has been brought to light and that was in an unimmunised girl aged 17. Since 1938 not a single case of diphtheria has been proved in any person who had previously completed a course of diphtheria immunisation.

P. H. J. TURTON,
Heanor UD, Notts. Medical Officer of Health.

CALIBRATING THE PELVIC CANAL

SIR,—It was with gratitude that I read in your leader of Aug. 7 the sentence: "It is wrong to suppose that the radiologist can now supplant the clinician in deciding the best treatment in doubtful cases of obstetric disproportion." I do not say, though I am unaware of them, that correct and reliable techniques have not been evolved for X-ray pelvic measurement. I assert that they are unnecessary. X-ray measurement is but one, and that an uncertain, attempt to measure the factors concerned in labour. If an X-ray picture could assess the strength of the uterine contractions, the woman's general health, her psychological state, and then give us a mathematically accurate measurement of the pelvic canal and the fœtal head, *but only when labour has started*, it might convert the confirmed clinician to its use. Until then, radiological measurement of the pregnant pelvis must remain more of an academic plaything than a practical necessity. I must exclude a necessary X-ray picture in (say) the case of a suspected bony tumour of the pelvis, though I still think that such a tumour is easy of diagnostic access by the examining finger.

I am unaware of any research into the effect of X rays on the fœtus. Perhaps the time at our disposal has been too short for such a long-term inquiry, nevertheless, I feel that if the rapidly growing cell is more susceptible to the shorter wave-lengths than his more mature and sedate brother, then the developing cells of the fœtus may not be as immune as we care to think from even a short exposure.

There is a certain type of childish mind, common to some doctors and many patients, which confuses diagnostic aids with diagnosis. For them the shining callipers and the X-ray picture will no doubt remain. But since it is certain that disproportion cannot be proved to exist until labour begins, I heartily deprecate the use of a very uncertain diagnostic aid which too often causes fear in the patient, unconsidered action by the doctor, and for all we know, harm to the fœtus.

Wimpole Street, W.1. M. P. REDDINGTON.

SERIAL SPINAL ANALGESIA

SIR,—I should like to congratulate Dr. Lee on his instructive article in your issue of Aug. 7. He is, so far as I am aware, the first British anæsthetist to employ serial spinal analgesia, and much credit is due to his skill and perseverance in mastering this new technique so successfully as to have no untoward complications in a series of 105 cases. His use of the word "serial" is an improvement on "continuous," as used by American authors; but "fractional" seems to be more apt in describing Lemmon's method.

A number of anæsthetists have told me they have refrained from using continuous spinal analgesia on account of the added risks of meningitis. But Lemmon and Paschal described over 1000 cases without one instance of this complication, and in Lee's smaller series also this grave sequel was absent. Among his series there were nine upon which I performed antecolic Polya-Hofmeister subtotal gastrectomy for simple ulcer, and in none was there any postoperative complication or distressing symptom such as headache or urinary trouble. All were able to leave hospital, ambulant and on full diet, within 15 days of operation. It is true that for gastric operations the method is applicable only to the

I agree with those who consider it unnecessary and perhaps unwise to inject serial doses into the theca for minor surgical procedures or for operations unlikely to take more than an hour. Lee, however, maintains that the technique is so simple, once it has been mastered, that in the absence of any definite reason to the contrary this form of anæsthetic can be applied with equal success and with perfect control to any procedure, major or minor, below the nipple line. Certainly this method of Lemmon's, as adapted and modified by Lee, deserves extended trial by anæsthetists in this country.

Wimpole Street, W.1. RODNEY MAINGOT.

INHIBITION OF PROTEUS IN CULTURES FROM WOUNDS

SIR,—Professor Miles and Miss Hayward have done a service to hospital bacteriologists everywhere by calling attention to this everyday difficulty (*Lancet*, July 24). Like them we have found that the modified Fry method [1] enables us to recognise and isolate several organisms, especially hæmolytic streptococci and staphylococci and non-hæmolytic streptococci, more satisfactorily than any of the other procedures which have been suggested. (We have not concerned ourselves with strict anaerobes and have not tried the 6–8% agar which Professor Miles is now using.)

The modified Fry method is, however, uneconomical in that it involves planting two plates from every wound in which proteus may be present. To overcome this difficulty the following device was proposed by one of us (W. C. C.).

A ditch about 6 mm. wide is cut out of a blood-agar plate, separating off the area (F), approximately one-third of the whole, from the remainder (fig. 1). The swab from the wound or burn is now inoculated as shown (dotted line) on both areas. F is now flooded with a thin layer of melted agar at 45° C. (Fry procedure), care being taken that the agar covers the whole surface but does not also spill over into the ditch. Over half of the remaining area, if desired, a drop of 1 in 3000 gentian-violet can be spread (area GV) to suppress staphylococci and diphtheroid bacilli, and favour the detection of hæmolytic streptococci (Garrod,[2] Fleming[3]). As soon as the supernatant layer of agar on area F has set, this area only is flooded with a drop or two of absolute alcohol, which is left for about one minute (Butcher's modification of the Fry method), and the plate subsequently dried off for 10–15 minutes.

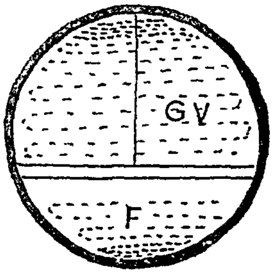

Fig. 1.

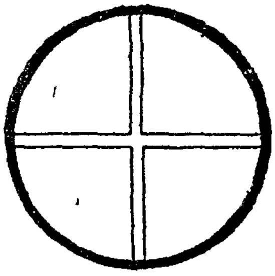

Fig. 2.

After incubation the surface of the agar on area F almost always remains free from growth and it is easy, with a little experience, to recognise the underlying colonies of hæmolytic streptococci, staphylococci, &c. If these require to be isolated —or if there is doubt about their identity—subcultures are made by stabbing through the supernatant agar layer with a straight wire and planting on one or more sectors of a plate divided by ditches, as shown in fig. 2. If any of the doubtful colonies turn out to be proteus they will not spread across the ditches.

This simple procedure has proved very satisfactory during the past twelve months with about 1000 swabs from burns in which proteus was present along with other organisms.

The following experience supports Professor Miles's criticism of the method employed by Major Pulvertaft [4]:

A swab from a burn, infected with proteus, staphylococcus and hæmolytic streptococcus was planted on: (*a*) a Fry ditch-plate prepared as above; (*b*) an alcohol-dried plate (methylated spirit 30 seconds); (*c*) an alcohol-dried plate, but spirit left for 3 minutes.

On plate *a* the Fry sector grew 15 colonies of hæmolytic streptococci and some non-hæmolytic colonies; on the other sector proteus had swarmed and there were other colonies. Plate *b*, after 24 hours showed 3 colonies of hæmolytic streptococci and a few staphylococci. After 48 hours proteus was beginning to swarm and the hæmolytic streptococci were not recognisable. Plate *c*, after 24 hours showed no growth. After 48 hours there were many colonies of proteus (not swarming) and some staphylococci. No colonies of hæmolytic streptococcus were recognisable.

It is evident that even a few seconds' exposure to alcohol had a considerable effect on the medium (plates *b* and *c*), and that relatively slight variations in that exposure might yield misleading results.

W. C. CAWSTON,
Glasgow. L. COLEBROOK.

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1. Spooner, E. T. C. *J. Hyg. Camb.* 1941, 41, 320.
2. Garrod, L. P. *St. Bart's Hosp. Rep.* 1933, 66, 203.
3. Fleming, A. *Brit. med. J.* 1942, i, 547.
4. Pulvertaft, R. J. V. *Lancet;* 1943, ii, 1.

FORMATION OF RED BLOOD CORPUSCLES

SIR,—In view of the evident interest of Dr. Duran-Jorda in the genesis of blood-cells, failure to draw his attention to the delights of hæmatological literature would be a failure in true hospitality. Violent controversy raged around the subject from the early years of this century until the death in 1938 of Naegeli, and rumblings were heard even as late as 1940. Battles were fought between the great guns—Dantschakoff, Dominici, Ehrlich, Ferrata, Hirschfeld, Jolly, Maximow, Naegeli, Pappenheim, Schilling, Schridde, Weidenreich, besides others still living—over methods of staining and observation, and suitability of material, embryological, adult and pathological. Beliefs were held with religious fervour and titles. Naegeli, known as the Blood Pope, led the Dualists, Maximow the "extreme Unitarians." Hard blows were given and taken, but this surely is the unkindest cut of all, that a diligent bench worker has ignored them in a country whose libraries have not yet been destroyed.

Mill Hill. B. D. PULLINGER.

TREATMENT OF OSTEOCLASTOMA

SIR,—The controversy aroused by Dr. Brailsford's article only shows that the formation in this country of a central registry of bone-tumours is long overdue. The bone-tumour subcommittee of the British Orthopædic Association fails to meet this want since it appears to be composed exclusively of orthopædic surgeons, and few can be satisfied with the results of surgical treatment. We should take as our model the American Registry which is composed of surgeons, pathologists and radiologists.

Cambridge. FF. ROBERTS.

MR. HUXLEY'S EYES

SIR,—Professor Hartridge says in his letter of July 17 that I gave no grounds for my statement that his theory is untenable. My grounds are that according to certain basic facts of ocular pathology no corneal deposits could possibly have been present in Mr. Huxley's case.

Wimpole Street, W.1. R. AFFLECK GREEVES.

LIBRARIES AND LEARNED PERIODICALS

SIR,—In my letter of July 17 I inadvertently failed to appreciate the proposals of a committee of the Association of Special Libraries and Information Bureaux, which has under consideration the preparation of a Union Catalogue of Periodicals in British Libraries.

ASLIB has been dealing with this problem since its conference last November and the committee which it is forming is inviting representation of the bodies to which I referred. The committee moreover proposes at present to limit its plan to the compilation of a consolidated check list composed of entries in the *World List of Scientific Periodicals*, the *Union Catalogue of Periodical Publications in University Libraries*, and the relevant section of the *British Museum Catalogue*. The proposed constitution of the committee, and the limited scope of its immediate programme, remove the scheme from any criticism which might have been implied in the latter part of my letter; and the work which it contemplates should be of assistance in the accomplishment of the larger scheme which I outlined.

London School of Hygiene and Tropical Medicine. CYRIL C. BARNARD, Librarian.

DOCTORS AND NURSES FOR CHINA

SIR,—In the spring of last year you inserted a letter from me asking for offers from doctors and nurses for service in a Red Cross hospital unit in China. Twenty-one were selected and sent out under Dr. W. S. Flowers and have established a base hospital at Changsha, Hunan. Sick and wounded, both civilian and military, are being treated and excellent work is being done. An appeal has now been received by the War Organisation of the British Red Cross and St. John for reinforcements. It is especially desirable that applicants should have a knowledge of the Chinese language or a background of Chinese experience. Further particulars may be obtained from Dr. H. Gordon Thompson at the headquarters of the War Organisation of the British Red Cross and St. John, 14, Grosvenor Crescent, London, S.W.1.

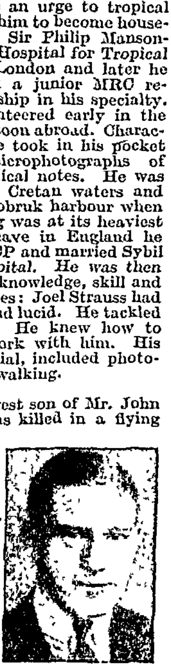
HORDER.

Obituary

Sir **GEORGE HASTINGS** who died on Aug. 13 in his ninetieth year, was house-physician at St. Bartholomew's Hospital when Andrew, Southey, Church and Gee were physicians and Matthews Duncan physician-accoucheur. He joined the staff of the Westminster General Dispensary, and by 1878 had published in the medical press observations on rheumatism, tetanus and Addison's disease. By the turn of the century he was an established consultant to several London banks and to the Gas Light and Coke Co. But to the modern world he was known as president of the Coaching Club, a meet of which he attended in his 86th year. His wife, who died in 1931, was a daughter of W. P. Frith, painter of "Derby Day."

Major **J. N. STRAUSS**, who died of smallpox in West Africa in June, qualified from the University of Manchester in 1933. After holding a post in Newcastle an urge to tropical medicine led him to become house-physician to Sir Philip Manson-Bahr at the Hospital for Tropical Diseases in London and later he was awarded a junior MRC research fellowship in his specialty. Strauss volunteered early in the war and was soon abroad. Characteristically he took in his pocket his own microphotographs of essential medical notes. He was rescued from Cretan waters and worked by Tobruk harbour when Axis bombing was at its heaviest there. On leave in England he took his MRCP and married Sybil Bowyer, SRN, of the London Hospital. He was then directed to West Africa, where his knowledge, skill and good humour had scope. E. D. writes: Joel Strauss had an exceptional mind, nimble, neat and lucid. He tackled difficulties with courage and wit. He knew how to work and it was a pleasure to work with him. His interests, which were never superficial, included photography, knots, astronomy and fell-walking.

Dr. **ARCHIBALD WARNOCK**, youngest son of Mr. John Warnock of Golfhill by Airdrie, was killed in a flying accident on May 7. He was educated at Coatbridge High and Secondary Schools and at Glasgow University where he graduated MB in 1941. After holding resident appointments in Glasgow Royal Infirmary and the Lanarkshire County Fevers Hospital, Motherwell, he was commissioned in the RAFVR in 1942 and served at operational stations in this country. A cheerful man, keen on sport, Archie Warnock excelled at squash rackets and tennis. His friends will recall his keen mind and sharp wit and perhaps above all his amusing impersonations. He was 25 years of age and unmarried.



Annan, Glasgow

Notes and News

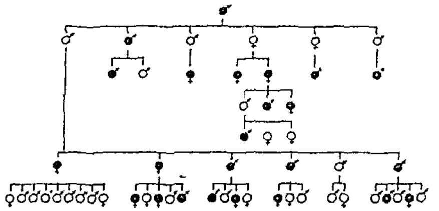
A RHEUMATIC FAMILY

W. N. PICKLES, MD LOND, MRCP

AFTER many years in country practice, my experience of rheumatic fever and rheumatic heart disease had been so meagre that I felt justified in considering them locally very rare. It then dawned on me that the sufferers mostly belonged to one large family and more than once the disease was discovered before the relationship. It was found possible to work out a family tree and to show that out of 53 descendants of a man—himself a victim—who died long before my time, 23 had suffered from rheumatic fever or had unmistakable signs of mitral stenosis. Besides the original victim I had to accept hearsay evidence of but three others, having myself attended and examined the remaining 20. Of these, 10 have died; one from an accident in youth, the others from heart disease between the ages of 18 and 70. Four with rheumatic fever have come under my care—2 only developing heart lesions. Nine with such lesions gave

5 lesions were discovered
young woman developed
s and her sister after

The causation of rheumatic fever is rightly one of the important objects of research at the present time, and as



Black circles indicate members of the family with a history of rheumatic fever or signs of mitral stenosis.

environmental influence is bound to loom large, it is as well to remember the existence of such families.

It is interesting and important to know what manner of people are being studied and something about their lives. After 30 years' close experience, I have no hesitation in singling these
outstanding in the distric
they are prosperous an
always have been prospe [illegible]
In personal appearance they are much above the average, tall and broad with an unselfconscious dignified carriage. They have a proper and justified family pride and a sense of inheritance, claiming descent from a follower of Alan of Brittany upon whom the Conqueror bestowed
armers
meant

The victims of mitral stenosis do not seem to follow the usual rules for this disease. The men live the strenuous lives of hill farmers. The women, besides doing the heavy work of the farmer's wife, bear children and feed them at the breast, and all positively refuse to believe that any care is needed. Yet none of these sufferers has up to the present died from heart disease at an early age. The diagram shows the sufferers in black and spouses are omitted. In no instance was the spouse rheumatic, so that the story is uncomplicated.

It is futile to speculate on the destiny of this remarkable family. "It is not observed in history that families improve with time" may well prove true in a medical sense. It may be that environment has hitherto been so favourable for this family that it has helped its members in part to elude the shackles of inheritance.

I am indebted to Miss Marie Hartley, of Askrigg, for the diagram.

FLUORINE OSTEOSCLEROSIS

THE first case of chronic fluorosis of endemic origin affecting the skeletal system to be described in the United States was in a man who had lived for many years in parts of Texas where endemic fluorosis is prevalent, the fluorine content of the drinking waters ranging from 4·4 to 12·0 p.p.m. Besides mottled dental enamel this man showed a severe anæmia; abnormal amounts of fluorine were detected in his teeth and bones. J. F. Linsman and C. A. McMurray, who report the case (*Radiology*, 1943, **40**, 474), suggest that, in areas where the drinking water contains over 3 p.p.m. of fluorine, sclerosis in the blood-forming marrow may give rise to a secondary anæmia. In India, C. G. Pundit and his associates have shown that when fluorine-containing waters are drunk an adequate diet is necessary if skeletal deformity is to be avoided, while in England, Kemp, Murray and Wilson pointed out that the production of characteristic changes in the vertebræ seems to depend on other factors besides fluorine intake, one being the general nutrition. Another source of fluorine in addition to natural waters has recently assumed importance. Rock phosphate, which contains up to 3·5% of fluorine, is probably being imported in increasing amounts from North Africa for use in fertilisers, and may reach water-supplies. It has also been shown that, under war conditions when phosphates of approved origin are not easily available, phosphates containing fluorine are finding their way into articles of food prepared for human consumption.

University of Oxford

On July 24 and 31 the following degrees were conferred:

MCh.—J. P. Childs and *A. N. Gutkelch.

DM.—R. H. Gardiner.

BM.—J. M. Rice-Oxley, G. D. Bolsover, G. S. Dawes, Anthony Roper, George Gordon, R. D. K. Levy, *Philippe Shubik, *T. C. Bradshaw, *C. W. Bartley, *J. H. Cumberland, J. E. French, Miles Weatherall, A. A. C. Dutton, G. J. Fraenkel, Cynthia M. Phillips, and Eileen C. Mercer.

At a recent examination for the diploma in ophthalmology the following candidates were successful:

F. P. Calhoun, Kathleen Davies-Thomas, Arnost Hirtenstein, H. C. Kodihinge, Anna M. MacMahon, Nora M. Oughton, Jean M. G. Shaw, and Bezley Thorne-Thorne.

Medical Casualties

The following casualties among RAMC officers have been lately announced:

Wounded.—Captain D. M. Cathie. MB GLASG.

Prisoner of War.—Major H. J. Anderson, MB; Captain W. T. G. Atkins, MB SYDNEY; Lieutenant M. G. Braham, LMSSA; Captain W. R. Grant; Captain J. F. Pantridge, MB BELF; Major J. A. Reid, LRCPE; Captain Conrad Rigby, MB LPOOL; Captain Alfred Roy, MB GLASG.

Safety Training Exhibition

The Royal Society for the Prevention of Accidents is holding an exhibition at the Dorland Hall, Lower Regent Street, London, S.W.1, from Sept. 3 to 17. Further particulars may be had from the secretary of the society, Terminal House, 52, Grosvenor Gardens, S.W.1.

Lectures on War Surgery

On Aug. 18 Sir James Walton gave the first of a series of eight lectures, arranged by the British Medical Students Association. The lectures will be given at University College Hospital medical school at 4.30 PM every Wednesday till Oct. 6, and the programme is: Dr. J. Trueta, the biological treatment of war wounds and fractures; Mr. A. Tudor Edwards, wounds of the thorax; Major-General C. Max Page, surgery in the field; Mr. A. H. McIndoe, injuries of the face; Colonel Elliott C. Cutler, American views; Mr. H. J. B. Atkins, burns; and Surgeon Rear-Admiral G. Gordon Taylor, sea injuries and problems of shipwrecked seamen. Tickets, available only to members of the association, may be had from the BMSA representative in each school.

Rehabilitation for Seamen

The Liverpool Seamen's Welfare Centre to be opened at Summerlands, near Kendal, in November, is the first rest and rehabilitation centre for men of the Merchant Navy. The mansion, which has an estate of 55 acres, will provide free board and lodging for 55 trainees, and a further 20 beds for seamen in need of a fortnight's holiday, who will pay up to 28*s*. a week. Men who have completed the rehabilitation course can remain at Summerlands making light turbine engines or ships' furniture. Later it is hoped to build cottages for the married permanent staff. A similar centre for Merchant Navy officers is planned.

Colonial Education Commissions

The commission appointed to inquire under the chairmanship of Sir Cyril Asquith into higher education in the colonies includes Prof. A. V. Hill, D SC, and Prof. J. A. Ryle. A commission which will deal particularly with British West Africa has also been nominated, of which Mr. Walter Elliot is to be chairman and Dr. E. H. T. Cummings, MOH of Sierra Leone, one of the members.

Association of Port Health Authorities of the British Isles

The autumn meeting will take place in the City Chambers, Glasgow, at 9.30 AM on Friday, Sept. 3. The speakers will include: Dr. A. D. Briggs, on hospital facilities for merchant seamen; Dr. Alexander Hutchison, on medical services for merchant seamen; Dr. George Buchanan, on medical arrangements for dockers in ports. Further information may be had from the MOH, Public Health Department, 23, Montrose Street, Glasgow.

Association of Speech Therapists

The remedial section of the Association of Teachers of Speech and Drama has now been reconstituted under this name as an autonomous body. Dr. E. J. Boome is president of the new association.

TERMINATION OF EMPLOYMENT.—"Persons whose names are on the Medical Register and who are employed in a professional capacity" are excluded from the provisions of the Control of Employment (Notice of termination of employment) Order 1943, which comes into force on Aug. 20. Accordingly it will be unnecessary for a doctor to notify the local labour exchange when his employment ends.

Captain DONALD JOHNSON, RAMC, has been nominated as Independent candidate in the by-election at Chippenham, Wilts. Dr. Johnson, who is a barrister-at-law and a graduate of Cambridge University, qualified in 1926 and has worked with the Grenfell mission in Labrador.

Appointments

DAVISON, GEORGE, MD DURH., MRCP, DCH: hon. asst. physician to the department of child medicine in the Royal Victoria Infirmary, Newcastle-on-Tyne.

WRIGHT, ELSIE, MD LOND.: hon. asst. physician to the department of child medicine in the Royal Victoria Infirmary, Newcastle-on-Tyne.

Births, Marriages and Deaths

BIRTHS

BEMBRIDGE.—On Aug. 11, at Cardiff, the wife of Lieutenant B. A. Bembridge, RAMC—a son.

GUNN.—On Aug. 11, the wife of Colonel William Gunn, MD, of Glasgow—a daughter.

HUMBLE.—On Aug. 13, in London, the wife of Dr. J. G. Humble—a son.

KELLOCK.—On Aug. 10, in London, the wife of Dr. T. D. Kellock—a daughter.

LAVENDER.—On Aug. 11, the wife of Surgeon Lieut.-Commander D. C. Lavender, RNVR, of New Jersey, U.S.A. and Barnet, Herts—a daughter.

McCLEAN.—On Aug. 11, the wife of Surgeon Lieutenant Ian McClean, RNVR—a son.

SAWLE THOMAS.—On Aug. 12, at Northampton, the wife of Dr. J. C. Sawle Thomas—a son.

UNGLEY.—On July 30, at Newmachar, Aberdeenshire, the wife of Surgeon Commander C. C. Ungley, RNVR—a daughter.

MARRIAGES

ASHER—ELIOT.—On July 27, in London, Richard Alan John Asher, MRCP, of Earls Colne, Essex, to Margaret Augusta Eliot.

BALY—HUTCHISON.—On Aug. 7, at Shanklin, Peter Leonard Nickson Baly, surgeon lieutenant RNVR, to Suzanne Hutchison.

GILBERT—DON FOX.—On Aug. 7, at Frensham, Surrey, Edward Theodore Gilbert, DSO, OBE, captain RAMC, of Belfast, to Hebe Helen Mary Don Fox, lieutenant RAMC.

GLOVER—LOCHORE.—On Aug. 10, in London, Eric Charles Glover, surgeon lieutenant RNVR, younger son of Dr. J. Alison Glover, to Jean Mary Lochore.

TOWNSEND—REEKS.—On Aug. 7, at St. Albans, Horace Samuel Townsend, MRCS, Colonial Medical Service, to Phyllis Victoria Reeks.

YOUNG—BERRY.—On Aug. 11, at Thorp Arch, Yorks, J. S. Young, captain RAMC, of Windsor, Ontario, to Evelyn Berry, VAD.

DEATHS

AITKEN.—On Aug. 6, at Glasgow, John Aitken, MD GLASG, formerly of Alassio, Italy.

HOLMES.—On Aug. 16, at Matlock, Geoffrey Holmes, MB CAMB, senior consultant, Smedley's Hydro, Matlock.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.

PLANNING WITHOUT A PLAN

A. H. T. ROBB-SMITH, M A OXFD, M D LOND

DIRECTOR OF PATHOLOGY, RADCLIFFE INFIRMARY; NUFFIELD READER IN PATHOLOGY, UNIVERSITY OF OXFORD

FOR over a year schemes for the reorganisation of the medical services have been appearing, some devised by individuals, others by representative bodies. They include the draft interim report of the Medical Planning Commission (British Medical Association 1942), the interim general report of Medical Planning Research (1942), the *Socialist Programme for Health* and *Medicine Tomorrow* (Socialist Medical Association 1942a, b), *Health for the People* (Liberal Party 1942), *Britain's Health Services* (Communist Party of Great Britain 1942), *National Service* [illegible] 43), and *The Reform of the* [illegible] ity 1943). In essentials they [illegible] ples of a scheme should be [illegible] BMA in *A General Medical Service for the Nation* (1930):

1. That the system of medical service should be directed to the achievement of positive health and the prevention of disease no less than to the relief of sickness.

2. That there should be provided for every individual the service of a general practitioner or family doctor of his own choice.

[illegible]

4. That the several parts of the complete medical service should be closely coordinated and developed by the application of a planned national health policy.

[illegible] s varies [illegible] er, with [illegible] ocialist [illegible] eration [illegible] to carry them into effect.

What is a plan? As Mumford (1940) points out it "may merely be a dodge for evading the realities of life and for avoiding the possibilities of action. . . . In contrast, genuine planning is an attempt, not arbitrarily to displace reality, but to clarify it and grasp all the elements necessary to bring the geographic and economic facts in harmony with human purposes. It involves four stages. The first is that of survey . . . the second stage is the critical outline of needs and activities in terms of social ideals and purposes, the third stage is that of imaginative reconstruction and projection. . . . Now [illegible] out a survey of hospital services in many parts of the country on behalf of the Ministry of Health but so far as is known no survey of medical services is being carried out.

In *Medicine Tomorrow* and *National Service for Health* it is suggested that the services should be planned on a divisional unit of 100,000 population, having a general hospital of 1000 beds with a whole-time staff of 50 doctors and 4 or more local health centres, each served by 8–12 general practitioners. Thus it is considered that 50–100 whole-time doctors will provide an adequate health service for a population of 100,000, and this is in line with the Walton Plan (1939) and Murray's *Health for All* (1942). On this basis 37,000–46,000 doctors are required for a complete health service for Great Britain; the *Medical Directory* for 1938, the last year for which population figures are available, gives the names of 42,495 doctors resident in Great Britain, and even if a correction, on the basis of the 1931 census, is made for non-practising doctors, &c., there would be 37,000, or 82 doctors per 100,000 of the population, and most of such doctors are occupied whole time in the practice of medicine *even though they may not be members of a* whole-time salaried service (table I).

TABLE I—PROPORTION OF DOCTORS TO POTENTIAL PATIENTS

—	Population (estimated 1938)	Total doctors *	Doctors per 100,000 population	Practising doctors †	Practising doctors per 100,000 population
London	6,570,000	9250	142	8325	125
Provinces	32,180,000	25,500	79	22,950	71
Scotland	4,990,000	5850	117	4083	82
Wales	2,465,000	1895	76	1705	69
—	46,205,000	42,495	92	37,068	82

* *Medical Directory*, 1938. † Corrected on basis of 1931 census.

[illegible] an investigation by "Mass Observation" would be instructive. In any survey of health services three aspects have to be considered—the service to the [illegible] ades- [illegible], but [illegible] oppor-tunities to advance it. This policy must at present be utopian, for there are far too few doctors to put it into effect; but it might be useful to consider in broad outline the shortcomings of the health services in the prewar years and make an approximate estimate of the number of practitioners required to carry out such a policy.

RURAL AREAS

[illegible] tandard of service, though a [illegible] ent with the squirearchy than [illegible], the insured patients receive a [illegible] -insured lower-income population, who delay calling the doctor or discourage visits for economic reasons. Health examinations (antenatal care, school clinics, &c.) are often in the hands of the practitioners with satisfactory results, but sometimes the liaison between the public health authorities and the practitioner is poor. Specialist advice is non-existent save for those who can go to the hospitals in the towns to receive it or pay enough to have it brought to them. There may be a cottage hospital in the vicinity, of variable quality, staffed by the local practitioners.

The social circumstances of the country doctor are satisfactory—he will commonly, by tradition, live in a fine eighteenth-century house and have leisure in the summer to indulge his hobbies—but he is relatively isolated from his colleagues and has little opportunity for advancing his knowledge of the science of medicine, though he usually has time and opportunity to become a master of the art of medicine. The surgeries in the smaller villages will often be unsuitable and ill-equipped, and he may suffer under the drudgery of being his own dispenser and bookkeeper.

URBAN AREAS

In the larger towns there may be a few general practitioners without panel work who combine social grace with medical ability, and provide their patients with a good service, and themselves with satisfactory remuneration and living conditions; but most combine panel with private work and are invariably overworked, especially in the winter; and as the degree of overwork increases so the standard of service to their patients falls. In acute disease, making allowance for the time available, medical skill will be provided equally for all classes of patients, but in chronic and "minor" ill health the attention given to the insured classes is usually less thorough than that given to the fee-paying patients. There is little leisure for thinking about medicine, academic contacts, or increase of knowledge, and such leisure as may be found is of necessity spent in relaxation in order that the strain of practice may be met without physical breakdown. Liaison between the public health authorities and hospitals is often poor, and there is the same lack of specialist advice, though the vicinity of hospitals makes this a little less serious than in the rural areas.

The social circumstances of town doctors vary considerably but on the whole are not so agreeable as in the country, though the financial gain is often greater in towns.

HOSPITALS AND SPECIALISTS

The hospital services are diverse. There may, in small towns, be moderate-sized hospitals, staffed by general practitioners with some leaning towards a specialty. The standard of work in these hospitals is variable but in most of them the lack of adequate equipment and time prevents first-class work being done. Near large cities, hospitals of moderate size are often staffed by visiting consultants attached to the large voluntary hospitals; but again lack of time and equipment makes it difficult to provide a first-class service. In larger towns and cities the voluntary hospitals are usually staffed wholly by consultants. The inpatients receive an excellent service—indeed, it is commonly better than that which even the richest patients get in their homes or in a nursing-home, because organisation and equipment are better, and the cost of the individual services can be ignored. Outpatient work is marred by a lack of leisure and the necessity for allocating too much of the work to inexperienced junior members of the staff. The necessity for speed, though seldom causing grave clinical errors, leaves no opportunity for ascertaining the environmental circumstances of ill health, and often the patient of small means will ask for a private consultation so that he or she can buy sufficient of the consultant's time to discuss their worries and troubles. The halcyon days of the specialist are when he is a senior registrar or assistant physician and has learned enough of his subject to appreciate its problems and yet has the leisure to investigate them; however, success in the form of growing consulting practice or the necessity of making a living renders this period all too short. The whole-time appointments in the teaching hospitals are relatively so few that the time available is largely occupied in clinical practice, teaching and organisation, and there is little leisure for original work. The municipal hospitals are rapidly improving their services and the facilities for their staff, yet on the whole the staffing is inadequate and the pay much below what can be earned in private practice; nevertheless the advantage of the working conditions in some municipal services are such that doctors of real ability are joining them, being prepared to exchange financial reward for the opportunity to do good work.

This review must in many respects be inaccurate and superficial, but it should show that the prime fault of the medical services may be summed up in the catch phrase of 1941–42—"too little and too late." Little consideration has been given to preventive medicine; and indeed if the present medical profession has not enough time for thorough remedial medicine it can have none to spare for studies of environment and periodic health examinations, *which might prevent minor ailments from becoming* chronic or developing into an incapacitating disease.

Outline of a Medical Service

lanning the health services for an area, the first ation must be the distribution of the potential patients and the geography of the area, and what is the smallest population that can economically, in terms of staffing, support a complete health service.

The Labour Party and Socialist Medical Association suggest that the number of potential patients which would justify the concentration of specialists of every type is about 100,000, though the regional authority which would coördinate health services could serve an area analogous to an existing county. In my view this unit is too small; a population of between 250,000 and 300,000 seems to me the smallest that can be provided with an adequate comprehensive health service, and the regional area which could embrace almost every type of service would correspond to a population of about a million, though naturally the population per acre (which ranges from 60 in London to 0·03 in Ross and Cromarty) is an all-important controlling factor.

In considering the number of doctors per unit of population, it has already been inferred that the numbers suggested in the published schemes are insufficient, because they correspond to those already available in 1938 when the service was in many ways grossly inadequate. There is no reason to suppose that doctors in a whole-time salaried service would work harder or better than they do in their present whole-time profession; indeed the loss of the "profit motive" would reduce the enthusiasm for overwork. Additional secretarial and dispenser assistance would save the doctor's time, but this saving would be too small to make good the shortage of doctors, which is the real defect in the present health services—a defect which cannot be resolved by any plan for the immediate institution of a comprehensive health service. This defect can be remedied only by a well-planned long-term policy, which will not only improve working conditions but also encourage the most suitable people to enter the profession and train them properly.

GENERAL PRACTITIONERS

The BMA (1943) suggests a ratio of general practitioners to population of 1 : 1500–1800. An adequate curative service could probably be provided by one general practitioner per 1500 of the population in rural areas, and one per 2000 in towns with a population of 50,000 and over (table II). A larger proportion of doctors is needed in country districts because of the greater distances travelled and because all the existing health services (maternity, school clinics, &c.) would be carried out by the general practitioners themselves; whereas in the towns, though the morbidity-rate is higher, some of these health services would probably be undertaken by specialists, and the increase in whole-time industrial medical officers would also relieve the urban practitioner of the full weight of his practice. According to PEP in 1937, it is uneconomic, unless there is a special occupational hazard, to employ a whole-time MO in works with less than 3000–5000 employees, and at that time only 1% of the industrial population were in factories of this size; this would justify about 60 whole-time industrial medical officers in Great Britain, but clearly the number of large factories is greater at present and likely to continue so.

TABLE II—SUGGESTED DISTRIBUTION OF GENERAL PRACTITIONERS IN GREAT BRITAIN

—	Population	Suggested GP ratio	No. of GPs required
In rural areas and towns of less than 50,000	30,000,000	1 : 1500	20,000
In towns of 50,000 and over	16,000,000	1 : 2000	8000
Totals	46,000,000	..	28,000
Socialist Medical Assn.	..	1 : 3000–1 : 2000	15,300–23,000

With the suggested ratios it should be possible for the doctor to treat the sick adequately during summer and winter, and in the summer to take adequate holidays, spend time in postgraduate work and begin in a small way routine health examinations. Sufficient time to treat sickness will inevitably develop the doctor's interest in prevention—which in most cases is there already—and also give him the opportunity to put active preventive medicine into practice, if the authorities who control many of the environmental factors affecting health are sympathetic, willing, and able to act on his advice.

As to what the general practitioner will have to do for his population, the following is taken with slight modifications from the interim report of Medical Planning Research.

1. General bedside diagnosis, especially medical and surgical emergencies.

[illegible]

such as venereal disease).

[illegible]

6. Child welfare.

7. Antenatal and postnatal care, and midwifery of uncomplicated cases.

8. Minor surgery and medical first-aid in surgical emergency (excluding anything but the first-aid treatment of fractures).

9. Forensic medicine as it affects general practice.

In addition, he has to be a guide, philosopher, and friend to his patients and their families, and a combination of home health-educator (ready with advice on ventilation, diet, exer-

alth relations officer and

need and are entitled to

THE HEALTH CENTRE

out, the "health centre" has

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Local health centres.

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would be an improvement but there is considerable disagreement as to who should provide and equip these centres. Medical planners have suggested that each health centre should house 8–12 general practitioners; this would mean, on the population ratio proposed here, that a

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and that the "borough" with about 40,000 people should have a hospital. PEP (1943) agrees; the "subcentre," with a population of about 4000, should

be within about half a mile of

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al health centre—to serve a

and be within $\frac{1}{4}$–$\frac{1}{2}$ mile of its users (the road pattern of towns influences the distribu-

A problem

large towns th

would prefer not to live and yet these districts must be given an adequate health service; he may elect to live outside the town, and although street telephones will be available, yet by the time his car has been started and the traffic lights overcome, the delay might be fatal; this could be met by a doctor being on duty for several health centres and sleeping at one of them during his period of duty.

Rural health centres.—In small towns (under 10,000) and rural areas the health centres will need to be more

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ists, tuberculosis officers, and others, in addition to the general practitioners' own

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suggestion put forward by the RIBA (1943). Such an

centre for the district nurses; it would have an almoner, and its own ambulance, and indeed could become the welfare department of the social security office.

"Freedom of choice" has become a political slogan; but it is not a question of politics but of population distribution. In the North of Scotland there can never be any real freedom of choice of doctor, whereas in the large towns there will be plenty to choose from. Nor is there any ethical problem if a much-chosen doctor has to refuse to accept patients because he has reached his quota; there is already a statutory limitation of the number of insured patients, and busy doctors have been known to refuse fee-paying patients. The real problem arises if there is a doctor whom no-one or very few will choose. Perhaps he might become a hospital administrator or be put in charge of the regional health department!

On the other hand, continuity of medical supervision is of real

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them each

criticism o

different doctor on each visit.

HOSPITALS AND SPECIALISTS

It is difficult to estimate the number of specialist required in a comprehensive health service, for at presen it is only in maternity cases that there is a free domiciliar specialist service. Specialists provide a consultant o therapeutic service for all patients admitted to or attend ing the outpatients of hospitals; for fee-paying patient there is a domiciliary service, but for financial reason this is not used so widely by those of moderate means a by the well-to-do. On occasions specialists may provide

In a comprehensive health service full domiciliary and local health-centre consultative facilities would be provided, necessitating a great increase in specialists of

problems might arise in relation to consultants in a comprehensive health service—for instance, a patient may demand a specialist's attendance when the general practitioner does not consider this necessary. A second

and neurosurgery the choice must be limited at the best of times.

Naturally any doctor appointed as a specialist will expect full freedom to practise medicine in the way he considers desirable; the criticism of his colleagues, the post-mortem room and morbidity statistics will control ill-judged methods more effectively than administrative vetos. Just

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where all the routine diagnostic and therapeutic work is completed in a long forenoon; apart from those on emergency duty, the staff are free in the afternoon to carry out original work. In Russia doctors are not encouraged to work more than a five- or six-hour day, "the rest of their time is supposed to be free for study and contact with the other health workers" (Needham 1942).

In addition to good library facilities and leisure for original work (a certain municipal hospital, in addition to an active research committee, provides its staff with over a hundred journals and a clinical artist) there must be ample secretarial assistance and a first-class clinical records department. Lastly, in addition to ordinary holidays, there should be a year's study-leave at least every seven years, taken as a whole year, or in fractions thereof; Osler was constantly preaching and practising that the student practitioner requires at least three things with which to stimulate and maintain his education: "a notebook, a library and a quinquennial brain-dusting."

In considering the hospital pattern one must recognise two grades—the key hospital and the intermediate or local hospital. A hospital of less than 50 beds is not economically sound; most local hospitals should have 100–200 beds and must at least have a resident medical and a resident surgical officer—relatively senior posts of registrar standing. The work of the local hospital as set out by Medical Planning Research (1942) is sound and practical. Infectious diseases, however, should not be admitted to the local hospital but transferred to the infectious-diseases wards of the key hospital, where, in an area holding 250,000 people, there would be enough beds to justify medical personnel specialising in communicable diseases. The idea of including wards for the chronic sick, the infirm and slowly dying in the local hospital so that they may be nursed near their friends and relations is excellent; and so is the idea of a hostel, near the local hospital, to accommodate children of local women admitted to the key or other hospitals. There is also a need for more alms-houses for the aged. These people, if they are not in real ill health but are merely infirm, and have no-one to look after them, should not have to enter the wards of institutions but should have a room or two with their possessions around them, in a community where they will have companionship or relative privacy as they wish, and assistance to make their last years comfortable.

The key hospital should be in the form of a medical centre with a general hospital block, mental hospital block and other long-stay hospitals, such as orthopædic, tuberculosis, &c. With existing hospitals it may in many cases be impossible to achieve this grouping, and for large towns the long-stay hospitals should clearly be in the country, but wherever possible the medical centre is desirable, from the point of view both of economy and of medical advancement. A difficult problem is that of the special hospitals; there is much in favour of hospitals of 50–150 beds dealing exclusively with nervous diseases, pædiatrics, or some branch of surgery; yet their very specialism and isolation is a peril and it is probably better to have, scattered throughout the country, units devoted to these specialties of such size as to ensure a complete team of workers coördinated to practise the specialty yet having the benefit of frequent contact with colleagues in other branches of medicine.

In considering the number of hospital beds and specialists required for a comprehensive health service, it has already been suggested that in most parts of the country the population unit of 100,000 recommended by the Labour Party (1943a) is too small. A region of about 1,000,000 would be a workable unit which would almost be self-sufficient for specialist services, and a divisional unit of 250,000–300,000 would support a complete general specialist service without necessitating excessive travelling. Thus, a tuberculosis sanatorium of 400 beds could be supported by a million population and a sanatorium of this size could do something in the way of vocational training. Similarly, orthopædic and radiotherapy services can be organised efficiently with this size of region; whereas ear, nose and throat, mental diseases, infectious diseases and pathological services should not be operated in larger units than 250,000. Such specialties as neurosurgery, thoracic and plastic surgery and forensic [illegible] would probably require a population of about [illegible] to keep a coordinated unit fully occupied.

Naturally all these proportionate figures are in terms of the mixed urban-rural population which makes up three-quarters of Great Britain, but in the large towns and cities (over 250,000 population), where travelling is not a significant problem, it would be possible to have larger units of specialists serving larger numbers of people, and such units would have greater opportunities for teaching and research; nevertheless the specialist distribution proposed here would ensure that there was no isolation of specialists even in the urban-rural areas.

Considering the actual number of beds and specialists per head of population, one would agree with the Socialist Medical Association and Labour Party that one bed per 100 persons (excluding mental diseases) is a reasonable proportion, and that staffing should be generous, since the staff of all hospitals would be available for consultations in the health centres and in the patient's home. The Walton or Murray plans are more suggestive of the parsimony of the local-authority hospital, for one finds that in general medicine two chiefs and two seniors (presumably registrars) are expected to provide this consultative and domiciliary service for 100,000 people, and at the same time look after 300 general medical beds and 200 chronic cases! Table III seems to set out more practical figures, though probably to each specialist they will appear inadequate for his own specialty and grossly excessive for those of his colleagues.

TABLE III—HOSPITAL BEDS AND STAFF PER 100,000 POPULATION

The figures in parentheses are those in Stark Murray's *Health for All* (1942) and are similar to, but more generous than, those of the Walton plan (1939).

Department	Beds	Chiefs	Registrars	House-officers
General medicine ..	140 (250)	4 (2)	3·6 (2)	4 (4)
General practitioners' ..	60	..	..	0·4
Chronic sick *	156 (100)	..	0·4	0·8
Pædiatrics	30 (50)	0·8 (1)	0·8 (1)	0·4 (2)
Dermatology	12	0·4	0·4	0·4
Tuberculosis: Total ..	70 (80)	0·8 (1)	0·2	0·2 (1)
Sanatorium	40			
Infectious diseases ..	70 (70)	0·8 (1)	0 4	1·2 (1)
Functional nervous dis.	10 (10)	1·6 (1)	1·6 (1)	1·2
Mental disease	400			
Mental defect.	130			
General surgery *	168 (210)	4·8 (2)	4·0 (2)	4·8 (4)
Orthopædics *	52 (50)	1·0 (1)	0·5 (1)	0·5 (2)
Accident service ..	20	0 8	0·8	1·2
Plastic surgery	1	0·03	0 03	0 07
Neurosurgery	1	0·03	0·03	0 07
Thoracic surgery ..	1	0 03	0 03	0·07
Ear, nose and throat ..	20 (20)	1·6 (1)	1 2	0 8 (1)
Ophthalmology ..	16 (10)	1·6	1·2 (1)	0 8 (1)
Dentistry..	5	0 8 (1)	0 4 (2)	0·4 (1)
Gynæcology	50 (150)	1·6 (2)	1·2 (2)	1 6 (4)
Maternity	128	2 4	1·2	2·4
Venereal disease ..	5	0·4	0 4	0·4
Anæsthesia	..	3·2 (1)	2·4 (2)	1 6
Pathology	..	3·2 (1)	4 0 (1)	0·4 (2)
Diagnostic radiology ..	..	2·4 (1)	1·6 (1)	..
Radiotherapy	3	0·1	0·1	0 05
Physiotherapy	..	0·8	0·8	..
(Medical administration)	..	.. (1)	.. (1)	..
Total (a) excluding mental disease and defect.	988 (1000)	33 (17)	27 (17)	24 (23)
(b) inclusive	1518	35	29	25
Proportion for Great Britain ..	(a) 454,480 (460,000)	15,267 (7820)	12,553 (7820)	10,929 (10,680)
	(b) 698,280	38,750 (26,320)		

* Including tuberculosis.

As this method of proportionate distribution may
might be well to set out
posed for a mixed urban
ilation, in the main town
would be hospitals having
about 2850 beds (table IV)

TABLE IV—HOSPITAL BEDS AND STAFF AT A MEDICAL CENTRE FOR URBAN RURAL POPULATION OF 250,000

Department	Beds	Seniors	Registrars	House-officers
General medicine	250	10	5	10
Chronic sick	150		1	1
General practitioners	50			1
Pædiatrics	60	3	2	1
Dermatology	30	1	1	1
Tuberculosis, combined forms	20			
Infective diseases	175	2	1	3
Functional nervous disease	25	Staffed from mental hospitals		1
Mental diseases	100	4	4	2
Mental defect	[illegible]			
General surgery	300	12	6	12
Accident service	50	2	2	3
Ear, nose and throat	50	4	3	[illegible]
Ophthalmology	40	4	3	2
Dentistry	12	3	1	1
Gynæcology	100	4	3	4
Maternity	200	6	3	6
Venereal disease	12	1	1	1
Anæsthesia		8	6	4
Pathology		8	10	1
Diagnostic radiology		6	4	[illegible]
Physiotherapy		2	2	
Total	2840	78	58	56

The staff from these hospitals would act as consultants for health centres and domiciliary visits and to four peripheral (local or intermediate) hospitals each of 175 beds having the following accommodation, staffed by 2 senior resident officers, one medical and one surgical, and one house officer

	Beds		Beds
General medicine	25	General surgery	25
General practitioners	25	Maternity	30
Chronic sick	60	Gynæcology	6
Pædiatrics	4		

For the larger unit of 1 000 000 there would be an orthopædic hospital of 520 beds (including 120 beds for bone and joint tuberculosis) with a staff of 10 surgeons,
, and a tuberculosis
cians (including the
2 house-physicians
th a staff of 2 senior
house officer (as well
as physicists and others) would be attached to a general hospital for every 2,000 000 people, and there would also be *units of neurosurgery, thoracic surgery and plastic surgery* for every 3,000,000 people, each consisting of 30 beds, a surgeon, a registrar and two house officers

The general hospital beds would be divided into administrative units of convenient size, but if a hospital centre is achieved it should have common laundries, workshops, rehabilitation centres and steward s departments

The peripheral hospitals would serve for acute emer
gencies,
uncompl
general I
general
are admitted *to hospital* because they require diagnosis or special forms of treatment, but there are many conditions in which the diagnosis is not in doubt nor the treatment complicated yet they would be better treated in hospital with proper nursing and specialist aid at hand One is assuming that most nursing homes would die an early death and that private wards would be provided in the hospitals with varying grades of amenities comparable with those to which the patients are used at home

The actual bed distribution would depend on the density of population, and the general hospitals might have to be divided into 2 medical centres and the peripheral hospitals into 8 but it is essential that they should have adequate resident staff of some degree of seniority, and with specialists from the general hospitals immediately available

MEDICAL OFFICERS OF HEALTH

In 1937 there were
650 whole-
officers and
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here should
per 100,000
, educative
and prophylactic factors in health and disease, the doctors required for the medical services (maternity, tuberculosis, infectious diseases &c) being already provided for in the general practitioner and specialist services Presumably the region of supervision would

would be remedied

ADMINISTRATION

The
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doubt that the
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than doctors
for the appointment of a doctor to a large hospital much as large industries have active directors, with no special duties but time to see that all is well with the organisation, and ability and power to introduce improvements and remedy defects Such medical directors, should not *spend their whole professional lives in these posts,* but (rather as judges are appointed) be selected from the
,e of 45–50 for their
e up all clinical work
ation, there must be
posts in an organised medical
service, but administrators must be able to carry out their duties and not be supine civil servants, fearful of
amorphous
ors attached

administrative capacities, a
if they are competent and
assistance We must avoid a
inspectorate

EDUCATION

It is a curious feature of medical education that the
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diagnostic medicine The whole time professorial units
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clinical work or research, and for most purposes well prepared teaching is better than impromptu talks Probably 80–100 is the optimum economic annual entry of students to a hospital medical school the bottlenecks in the clinical course being gynæcology and midwifery, and pathology Provided the staffing of a hospital is adequate for clinical purposes and gives the staff time for some original work, an addition of 50 doctors should ensure adequate clinical and preclinical teaching for a yearly entry of 100 students. There are at present 29 medical schools in Great Britain, but there is a grave lack of facilities for vocational postgraduate training. This deficiency must be made good as soon as demobilisation starts.

The chief defect of the present war-time medical education is the shortage of the registrar class, who are almost all in the Services; when demobilisation starts there will be a large number of practitioners who qualified just before the war and have shown aptitude or a desire to become specialists but have not had the opportunity to receive the necessary vocational training. These doctors must be given this opportunity not only for their own sakes but because there must be an increase in specialists if a comprehensive medical service is to be instituted, and some of them must be available as teachers if there is to be the increase in practitioners necessary if a comprehensive medical service is to be practical and effective. Assuming that the conditions of the medical profession are such as to attract a large number of students to enter it, these students cannot start their clinical training until three years after demobilisation; during this respite two things can be done. First, the teaching hospitals, the larger non-teaching hospitals and those which for the war period have undertaken clinical teaching should concentrate on the vocational training of demobilised medical officers. Since such training must be by apprenticeship, rather than postgraduate lecture courses, the number of registrars and assistants who can be usefully employed and supervised in each hospital must be small but in the aggregate will probably be large enough to fulfil the demand. This is a form of training which does not require all the buildings and teachers of an adequate medical school but requires a well-equipped hospital, staffed by able specialists who have the time to train their assistants rather than to leave them to do the hospital work and learn or mislearn by their own experience, while the honorary staff spend their time in private practice. Secondly, the three years respite would allow a number of general hospitals, which are not at present medical schools but are big enough and have the clinical material necessary for a school, to add the lecture and demonstration rooms and laboratories needed for a medical school and also to build up their clinical staff so that it is sufficient to carry out both the hospital work and the teaching of students.

Cohen has expressed a fear that in a national hospital service there might be interference with the four freedoms essential for effective teaching and research, and suggests that the only way of ensuring such freedom would be to carry out medical training in hospitals under the direct ægis of universities.

RESEARCH

The word research has long lost its original meaning of re-examination and acquired a magical and ritualistic quality. All doctors should be inquisitive and have a desire to increase fundamental knowledge whether by the observational methods of Mackenzie and Lewis, the epidemiological method of Pickles, by experiment or some other way of approach. There are few investigators whose interest in their subject is so all-consuming or so recondite that they should spend their whole working days in research without an admixture of teaching or routine work; but there must be the leisure to think, observe and try, and, if these acts show promise, the opportunities to further them. In a well-organised health service there need be few whole-time research workers but there must be time and facilities for many to try to resolve their doubts. The whole problem of medical research has been admirably discussed by Gregg (1942).

FINANCE

As far as possible in this review the question of the administrative structure of the health service has been avoided and consideration limited to the pattern of service which would fulfil the provision of assumption B of the Beveridge report provided it was not trammelled by the organising bodies. Whether the administrative structure be modified local government, ministerial advisory committee, corporation, health provinces or you will, Pope's observation remains true—"For of government let fools contest; whate'er is best stered is best."

On the other hand, remuneration is all-important, for on this will depend not only the success of the service but its continued success. Only the Inland Revenue department know how much various grades of doctors earn, but the range is certainly large. If at the beginning of a salaried medical service, the salary scale was set well below the average level of the class (e.g., the whole-time EMS salaries), and there was an initial option for members of the profession to join the service or remain as free lances, only those whose income approximated to this scale would be willing to join the service and the more able and successful would stay out. Thus two grades of medical service would develop, an understaffed salaried service made up of the less successful members of the profession to whom the public would apply for certificates, and the more able members of the profession who would have to be paid for their services. Not only would this be disastrous to the national medical service but it would so discourage able young people from entering the medical profession that the standard of medical practice would rapidly be lowered. Unless the salary scale is at a fantastic level a proportion of successful consultants will no doubt remain outside such a service, but so long as this proportion is small it will not interfere with the success of the service.

There are scattered comparative-income figures and a few timid suggestions. The Insurance Acts Committee examined the 1931 accounts of a number of general practitioners doing insurance work. The gross annual incomes ranged from £1456 to £1954 and the net incomes from £926 to £1249; it seems probable that these net incomes are lower than the mean income of the profession. The salaries of the medical staff of the Ministry of Health range from £800 to £2200. The salaries of the EMS vary from £120 to £1300. The LCC salaries range from £120 to £1650 and in some cases a house and certain other amenities are provided; other authorities pay similar or slightly higher salaries. Whole-time clinical professors receive salaries ranging from £1200 to £2500, but are not provided with living quarters, though theoretically they have leisure to carry out research work which is regarded as a compensation for an income lower than they could earn in consultant practice. As to the proposed salary scales for a national service, there is the discarded Ministry scale revealed by the *Evening Standard*—£650 to £1600; Medical Planning Research suggested £100–£2000; Murray (1942) suggested £500–£1500; the *Lancet* (1943) proposes £850–£2000. Some schemes propose that general practitioners should be paid less than specialists, which seems unreasonable; both branches of the profession require equal attributes of skill differently applied, and it should be mental outlook or natural aptitude which determines the branch of medicine taken up and not financial advantages. In all the schemes, provision for superannuation is assumed and also the expenses of a car and secretarial assistance.

The estimates of the gross cost of a national health service are confusing. In the Beveridge report (appendix A) the Government Actuary gives £170 million as a round figure for expenditure on the health and rehabilitation service; PEP estimated the expenditure on the treatment and prevention of sickness in 1935 as £153 million. Medical Planning Research estimated the 1938–39 expenditure on treatment as £160 million, and suggested that a national medical service would cost £230 million a year, the additions being due to additional capital expenditure on new building and additional cost of nursing services. The Labour Party adopt the same sort of figures, and Stark Murray (1942) has calculated that a complete socialised medical service could be obtained for £140 million a year.

Two items in the PEP estimates suggest that the Government Actuary's figure is too low. PEP assumes that the average income of the 41,729 doctors in Great Britain in the 1937 *Medical Directory* was £1200. It has been estimated in this review that about 70,000 doctors would be needed to provide an adequate medical service, and Stark Murray himself, omitting certain services which here are believed to require 3000 doctors, calculates that 50,000 doctors would be required. Whichever of these figures is accepted it is clear that the cost of medical salaries alone would be 30–70% above those of the PEP estimates for 1935, assuming the same average income level. With regard to hospital services, the PEP esti-

mates were based on figures from the Central Bureau of Hospital Information for voluntary hospitals and information from public authorities; in 1935–36 there were 20
: ds and of these 80,000
were in -wards. It is generally
agreed al beds are needed per
100,000 or Great Britain and

Murray'
method
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published of the cost of a rehabilitation service.

DOCTORS REQUIRED FOR A COMPREHENSIVE MEDICAL SERVICE

In discussions on the proposed comprehensive medical service, it is often assumed that, on demobilisation, the large number of medical men in the Services will be immediately available for carrying this comprehensive service into effect. In reality the net increase in registered medical practitioners in Great Britain between 1938 and 1943 is only about 5000, and a proportion of these are foreign doctors on the temporary register. The return of all Service practitioners to their previous occupations would thus restore the number of doctors in civilian practice to a little above its prewar level. But liberation of occup
of enemy territory will
large number of doctors b
zie 1942) and in the occ
is uncertain how many of the refugee doctors will be anxious or able to return to their own countries.

Two estimates of the number of doctors required for a
service in Great Britain are as
octors required in the Forces on a

	This paper	*Stark Murray*
General practitioners	28,000	23,000
Specialists: Chiefs	15,250	7400
Specialists: Registrars	12,500	7400
House-officers	11,000	10,500
Hospital administrators	200	920
Medical officers of health	1400	?
Government advisors and administrators	200	?
Teaching and whole-time research workers	1500	?
	70,050	49,200 + 13100

The 1943 *Medical Directory* shows 47,697 practitioners in Great Britain; the average number of new registered practitioners is 1772 per annum and the proportionate removals (from death and other causes) is 880. The number of new registrations has been higher of recent years but an analysis of the dates of registration of the medical profession in 1940, which can be assumed to be roughly proportioned to their age-distribution, does not suggest that the loss from deaths is likely to decrease in the next ten years. The distribution by dates of registration of the whole profession (based on a random sample of 1700) is here compared with the registration dates of the BMA Representative Committee.

	Whole profession %		*BMA Representative Committee* %	
1870–74	0 05	39 25		75 5
1875–79	0 25			
1880–84	0 8			
1885–89	2 5			
1890–94	4 2		5 5	
1895–99	5 3		8 5	
1900–04	7 0		11 0	
1905–09	6 5		28 0	
1910–14	6 5		5 5	
1915–19	6 25		17 0	
1920–24	14 5	60 75	19 0	24 5
1925–29	13 25		5 5	
1930–34	11 0			
1935–40	22 0			

Assuming that the control by quota of the number of people entering the profession is continued until 1946 this would give a net increase each year of 1000–1200. If the quota control was released in that year and the terms of service compared favourably with those in other learned professions one might anticipate a large increase in the number of medical students. For example, between 1900 and 1914 the number remained fairly constant at about 1500; in 1919 it rose to nearly 3500. This increase would not affect the number of qualified practitioners until 1951–52. Accordingly, even making the most generous estima
expect the number of med
Britain to reach 70,000 until
or regenerating population
of doctors than one which i
it cannot be determined which trend the population will develop.

CONCLUSIONS

A comprehensive medical service for Great Britain would require 70,000 doctors and 700,000 hospital beds; these would provide an adequate curative and moderate preventive service. It will not be possible to provide this 47% increase in doctors until 1955 at the present rate of increase, and an understaffed comprehensive medical service would be almost as unsatisfactory as the present eclectic one. On the other hand, with a slowly increasing number of doctors, something could be done to improve gradually the medical services of the country along these lines:

1. A reasonable (though not optimum) proportion between general practitioners and population might be ensured, particularly in the urban areas; a modification of the Glasgow outdoor medical service might be used as a pattern.
2. An increased (though not complete) consultative service for the whole population could be provided.
3. The almoner and clerical staffs assisting the medical profession might be increased and this would allow more time
accommoda-

proportion to the increase in practitioners.

vary from one part of the country to another until the numbers of practitioners were sufficient to give a universal and adequate comprehensive medical service.

The problem of the administrative machinery for a comprehensive or improved medical service has been purposely omitted;
except in general terms
ing, and the training
staff to coördinate the services of a department of social security, could probably be achieved in a much shorter time than it takes to train a sufficient number of doctors
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Medical Schools

Deans of medical schools on whom a fourth year of war has pressed heavily tell us how the machinery of medical education is running. For their help and that of other university officials we tender our respectful thanks. The order here adopted is that honoured by time.

The OXFORD UNIVERSITY medical school is carrying on much as it did last year. Before becoming members of the university students must be accepted by a college, or one of the non-collegiate bodies (St. Catherine's Society in the case of men, St. Anne's in the case of women), and after passing the university entrance examination must take preliminary examinations in natural science before being admitted to the quota. At present, under the quota, 64 men can be accepted annually and 7 women; any vacancies left by men are open to women, but this year it so happens that there are none. It is just possible, however, that the women's quota may be slightly increased for the year 1943-44 only. Most students complete their premedical examinations before coming up to the university, and start work on anatomy and physiology during their first university year, taking organic chemistry at the end of their first term, and the rest of the first BM in their sixth term. No-one can take a BM, B CH degree unless he has first taken a BA, and in peace-time most medical students take a BA in the final honour school of animal physiology, but during the war a pass BA degree is being awarded on the results of the first BM, and the honours examination is being taken only by those whose tutors specially recommend them. After completing their preclinical examinations students have been able, since the war, to complete their clinical course at the Radcliffe Infirmary. Prospective students are strongly advised to apply to colleges or societies well in advance of their eighteenth birthdays, in view of the regulations about reservation. Details of the preclinical course may be had from the Acting-Dean of the Medical School, University Museum, Oxford, and of the clinical courses from the Clinical Sub-Dean, at the Radcliffe Infirmary. The diploma in ophthalmology is being granted as usual and information about the course for it can be obtained from the Reader in Ophthalmology, at the Oxford Eye Hospital in Walton Street. There is no dental school in the university.

In times of peace the minimum period of study for the medical degrees of CAMBRIDGE UNIVERSITY is 6 academic years, or 18 terms reckoned from the date of matriculation to the date of passing part II of the final examination. During the first 3 years medical students, like other undergraduates, are required to reside in Cambridge while the second period of 3 years is devoted to clinical studies at a hospital medical school in London or in one of the great cities. Candidates for medical degrees are normally required to obtain honours in a tripos and a satisfactory standard in anatomy and in physiology either in the natural sciences tripos or in the qualifying examinations in these subjects. The courses of instruction for the natural science tripos probably constitute the greatest contribution which the university makes to medical education. As a war measure the regulation requiring medical students to read for honours has been suspended but a large number have voluntarily taken the tripos courses and many have succeeded in reaching a good standard in part I of the natural sciences tripos at the end of their second year.

At the outbreak of war the university decided to allow medical students who had passed the required examinations and who had resided in Cambridge for two years to proceed to the BA degree after one year spent in clinical studies at a hospital medical school. The effect of these decisions has been to reduce the period of study for the medical degrees from 6 to 5 academic years, or 4 calendar years and 9 months from the October of the student's first year to the June of his fifth year. As a result the number of Cambridge medical students who began clinical studies in the autumn of 1939 was almost double the usual figure, for in addition to those who had completed the normal 3 years of residence a [illegible] ortion of men who had resided for only 2 years [illegible] e to pass the examinations in anatomy and in [illegible] gy and enter a hospital medical school.

The decision taken by the university in September, 1939, bore fruit in 1942, when the "double year" of students had completed 3 years of clinical study and were able to take the final examination. The average number of successful candidates in the final examination during the 5 years 1937-41 was 120. In 1942, 201 candidates passed the final examination. Thus at the end of the third year of the war, at a time when medical men were badly needed, the output of graduates from the Cambridge medical school was almost doubled. Of course any increase in the output of graduates produced by shortening the period of study must be temporary, and the number of candidates who present themselves for the final examination in 1943 and subsequent years will not exceed the normal figure.

The UNIVERSITY OF LONDON offers preclinical courses at St. Bartholomew's, Guy's, St. Thomas's, the Middlesex and St. Mary's Hospitals, at the London School of Medicine for Women and at King's College, University College and (for premedical subjects only) Queen Mary College. Students usually complete their clinical work at one of the London teaching hospitals. No additional second medical examination will be held this year, but an additional final examination has been arranged to begin on Jan. 31, 1944. The university diploma in psychological medicine and the academic diplomas in clinical pathology and in psychology are being offered as usual, and the course for the academic diploma in dietetics has been resumed. Courses for the diplomas in public health and bacteriology have been suspended during the war. It is probable that the course for the diploma in medical radiology will be held as usual next year. Internal students at present registered in the faculty of medicine number 3626—an increase of 32 on last year. Regulations for medical examinations and other information may be had from the Principal, University of London, at Richmond College, Richmond, Surrey.

Dental students may take courses for the BDS degree of the university at Guy's, the London, University College and King's College Hospitals, and the Royal Dental Hospital. The university does not offer an LDS diploma, but prepares students for the LDS of the Royal College of Surgeons. Particulars of courses may be had from the Dean of the London School of Dental Surgery, Royal Dental Hospital, Leicester Square, or from the deans of the medical schools named above.

UNIVERSITY COLLEGE medical school remains scattered, the premedical students at Bangor and the preclinical students at Leatherhead. With the return of several schools to London and the prospective return of others the idea of moving back to town has been carefully considered by the authorities of the college; in deciding to leave things as they are for the present, however, they have been influenced by the successful results of the present plan, the unusually high proportion of successes in examinations and the fact that for a second year three University College students have been chosen as Rockefeller students. The close association between staff and students possible in a residential community offers educational advantages which help to compensate for isolation from other faculties of the university. And Leatherhead is near enough to London for the teaching staff to keep in touch with colleagues there.

KING'S COLLEGE is the largest preclinical school in London, and has to limit the number of entries admitted each year to 120. It takes most of the preclinical students of Charing Cross, King's College Hospital, St. George's and Westminster. Since the beginning of the war, the Medical Faculty has spent one year at the University of Glasgow, and two at the new medical school of the University of Birmingham. The faculty returned to King's College, Strand, in September, 1942. Arrangements are being made for the return of dental students next session. The Michaelmas term begins on Sept. 29, 1943.

London Hospital students take their first MB and premedical courses at QUEEN MARY COLLEGE before beginning their anatomy and physiology. Queen Mary College is still a guest of King's College, Cambridge, and will remain there while the war lasts. Forty-nine students attended the college during the session 1942-43, of whom forty were first MB students and nine were Conjoint students. It is anticipated that similar numbers will be accepted for the coming session.

London Schools

The Medical College of ST. BARTHOLOMEW'S HOSPITAL still progresses as before, the preclinical students at Cambridge and the clinical students at Hill End and Cell Barnes (St. Albans), Friern (Southgate) and in Smithfield. The last year has been given up to improving the arrangements originally made and filling in some gaps, for instance, the course of normal psychology in the preclinical years which was dropped at the beginning of the war has now been begun again. Arrangements have been made for the teaching of midwifery at Bart's itself, instead of in the country, so that fewer sector hospitals are now used for the training of students. The preliminary course of medicine, surgery and pathology set up two years ago has been polished up and has proved to be a great success and will be maintained after the war; it is better than anything Bart's has had on similar lines before and is much appreciated by the students. All the outpatient departments have now been opened up and the numbers of patients attending approach prewar figures. The main outpatient block is also being opened up for teaching purposes.

The medical school of CHARING CROSS HOSPITAL was fully reopened in November, 1942, and except for the first six months of the clinical period students take their whole course in London. During the first six months they live at Ashridge Hospital, where they do three months as medical clerks and three as surgical dressers, take a course in elementary pathology, and attend elementary courses in systematic medicine and surgery. On going to London they complete their medical and surgical firms, and in their second clinical year hold appointments in all the special departments. Each student spends three months in the pathology and bacteriology laboratories. The post-mortem room is at present being rebuilt and other damage suffered in the blitz is being repaired. The whole of this work will be completed before the beginning of the new session in October. During the [illegible] been reopened, supplying [illegible] student consultative com[illegible] and the scheme of welfare for students' health extended. It is hoped that a reciprocal arrangement with the Royal Dental Hospital will make it possible to cover dental as well as medical examination and treatment. A fortnightly informal dance seems to give considerable pleasure to members of the students' club and their friends. The activities of the school now approach nearly to those of peace-time.

There has been little change in teaching arrangements at ST. GEORGE'S HOSPITAL during the past year. Students of all three clinical years remain in London where all facilities, except for midwifery, are available to them. Patients are returning to London in increasing numbers, an influx which has been reflected in attendances at the outpatient clinics over the year. Owing to demands made on accommodation by casualty work it has not yet been possible to provide midwifery beds; as before, [illegible] the Middl[illegible] Hospital, [illegible] the last s[illegible] has come into active use as a fully planned emergency hospital. Last year it was regarded as an annexe which could at any time serve as the teaching hospital in case of the total disappearance of St. George's at Hyde Park Corner. This conception remains, but meanwhile, since last November, it has housed an EMS head injuries unit of 70 beds, which was previously working at Leavesden. A further 50 beds have been made available for medical cases, notably for a clinic to investigate and treat gastric diseases. It has not been found necessary as yet to use any of these beds for routine teaching since ample facilities have existed at Hyde Park Corner during the past year. Specialised aspects of medicine and surgery will now be taught at Wimbledon. Children's beds are not yet available in the parent hospital and as a supplement to those in existence in the sector, a further 20 beds have been opened at St. Teresa's Home near the Wimbledon branch.

At GUY'S HOSPITAL everything has been going well during the past year. The preclinical students are still working at Tunbridge Wells. The classrooms and laboratories are within easy cycling distance of each other, so that no transport problems arise, and students enjoy something like the atmosphere of a university town. The clinical students still work in the sector hospitals in Kent and at Guy's itself. The shortage of staff has thrown much work on those who remain, but they have worked strenuously and keenly to maintain teaching standards. Applications for admission here, as elsewhere, are extremely numerous, but the quota maintains admissions at the prewar level. There is an active dental school.

Apart from a few improvements suggested by experience KING'S COLLEGE HOSPITAL medical school has continued during the past year on the lines followed in 1941. Working at the sector hospitals, students were able to take the greater part of the clinical course in the country, and as a result their health has been very good. Vacations have been curtailed with the result that examinations have been passed somewhat sooner than in peace-time. The examination records during the past three years have been better than for any corresponding period preceding the war. This is probably due partly to the fact that students have been living in, both at the sector hospitals and at the parent hospital, and have thus been brought into closer contact with their clinical work. The work of the dental school is unchanged.

At the beginning of the war the departments of anatomy and physiology of the LONDON HOSPITAL medical college were transferred to Cambridge, and so was Queen Mary College, mentioned above, at which students take their premedical course. During the blitz the dissecting-room in London was damaged by enemy action, but it has now been repaired and the preclinical students are returning from Cambridge at the beginning of next term. The rest of the hospital escaped serious damage. There are now 490 beds open in the London and 324 beds in the annexe at Brentwood, which is staffed entirely from the parent hospital. The junior clinical students spend the first year at Brentwood and then come to London for the rest of the clinical course. Sector hospitals are no longer needed for teaching, but students in their third year are still sent ou[illegible] and some of those working [illegible] ive at nearby county council [illegible] obtain relatively cheap board and lodging and in addition gain clinical experience in the evenings and at night. The students' hostel has been reopened, and the London looks forward to the coming academic year as one in which the medical and dental schools will run on almost normal lines.

With the return of the first year to ST. MARY'S HOSPITAL in January of this year, the whole of the preclinical course is now carried out in the school. Some 40 students continue to do junior clinical appointments at the large EMS and Middlesex county council hospital at Harefield, and a lesser number at 2 other sector hospitals, but the bulk of the clinical course is also at St. Mary's, where both the school and hospital buildings fortunately remain [illegible] ntinues to show no[illegible] also in its play—th[illegible], and the musical a[illegible] a busy and successful year.

Since October, 1942, all the preclinical students of the MIDDLESEX HOSPITAL have returned to London. The benefits of being at home again are very real—so real that they do not intend to leave London again. No big changes have been made in the lives of the clinical students, but a small step has been taken towards concentrating them again at the Middlesex. The arrangement is working well by which some of the ward appointments are taken at Tindal House Emergency Hospital, Aylesbury, Mount Vernon Hospital, Northwood, and the Central Middlesex County Hospital. The governors are deeply grateful to those hospital authorities and their staffs for their contributions to medical education. A few students continue to do short-term appointments at the Royal Hospital, Wolverhampton, and experience has shown that the men who go to Wolverhampton benefit greatly. For some time now a good many of the senior clinical students have been holding student house appointments, both at the Middlesex and in one or two sector hospitals. These appointments have proved to be truly in the interest of the student's medical education, provided that he holds such a post only for three months, fairly late in the clinical period. Probably the most profitable time for him to hold such a post is, say, 6–9 months before his qualifying examinations.

Preclinical students of the Royal Free Hospital (London School of Medicine for Women) have been working for the past three years at the University College of the South West, in Exeter, but the council of the medical school have decided that they should return at the end of the present session, resuming work in their London quarters on Oct. 1. Clinical work continues as usual at the hospital and the experience of students has been augmented through their work in several EMS hospitals in the sector. The midwifery beds at the Royal Free have been increased, and there are some additional general beds in the hospital. Outpatients have gone up considerably.

At St. Thomas's Hospital medical school the premedical and preclinical subjects are still centred on Godalming, but the governing body of the school is making arrangements for the return of these departments to London by October, 1944. The department of chemistry has become the department of biochemistry, and the teaching of all the introductory subjects is being more closely correlated with clinical teaching, so that the premedical and preclinical subjects are no longer preliminary nuisances which fade into the limbo of things to be forgotten after the first and second MB examinations. The early and late clinical periods are now dealt with in London, the periods of inpatient medical clerking, surgical dressing and midwifery are spent at St. Thomas's Hospital, Hydestile, where that branch of the hospital is consolidated in its delightful environment. St. Thomas's in London has 170 beds and the casualty and outpatient departments are almost on a prewar basis. The standard of work and progress demanded of St. Thomas's students in order to justify continued reservation is reflected in examination results which show a remarkably high percentage of successes.

University College Hospital medical students now receive the whole of their clinical teaching in London. Twice within the past year the school has had to reorganise its teaching arrangements to fit in with the changes in hospital accommodation within the sector. Staff and students have accepted with commendable fortitude the strains and stresses inseparable from such moves, and are now rewarded with a satisfying sense of homecoming after a stormy voyage. The staff feel that the experience gained in travels round the sector will prove not to have been wasted when they begin reshaping the pattern of clinical teaching for medical students. The dental school is still functioning in London.

The West London Hospital school gives preference to women students reading for the London University medical degrees but other students are accepted when vacancies are available. For the moment no men students are being accepted. During the first two years of the war the number of entries fell but they have now increased and at present the school cannot accept all the students who apply. The standard of the students is very high, only about 10% of applicants being ultimately selected. As the hospital has suffered no damage from enemy action it has not been necessary to make use of the sector hospitals, and teaching is still being carried out at the West London, with the exception of practical obstetrics which is taught at one of the maternity units of the Middlesex county council. House appointments are available for students on qualification but the reduction in resident staff required by the authorities has meant that fewer of these posts will be available during the coming year. In spite of further depletion of the honorary staff to satisfy the increasing needs of the Services, the teaching in all departments has been satisfactorily maintained.

Westminster Hospital has made further progress in the past twelve months. More beds have been opened, offering increased experience in general medicine and surgery, and the pædiatric and maternity units have been re-established. Teaching in medicine, surgery and pathology at Staines County Hospital is being maintained at a high standard. A director of studies has been appointed and coöpted on to the school of medicine committee, ensuring a close liaison. The maternity unit at Ripley is served by Westminster's own obstetric staff, so that the resident students receive full instruction from their own teachers. The return of King's College to London has enabled preclinical students to meet clinical students, with the result that all the academic and social activities of the school and students' union are once again on a prewar level. The programme for lectures and clinical instruction has increased in spite of the loss of teachers to the Services, and a high standard has been maintained, judging by examination results. The number of students of good quality seeking entry to the school is so great that a problem has arisen in placing them for a course of study.

The School of Dentistry of the Royal Dental Hospital of London admits students who have passed their premedical examination in zoology, botany, physics and chemistry. They take courses in dental mechanics, metallurgy and special anatomy for the first two years, and during this time they also study general anatomy and physiology; for the last few years the anatomy and physiology courses have been held at the Royal Free Hospital, but in the session 1943–44 students will be returning, as of old, to King's College in the Strand for this part of the curriculum. For general medicine and surgery the students attend clinics at Charing Cross Hospital. There are also dental schools at Guy's, University College Hospital, King's College Hospital and the London, but the other London teaching schools offer no organised teaching for dental students; medical students of those schools, however, who wished to study dentistry could of course be credited with the general courses they had taken there.

Other English Schools

The medical school of the University of Durham is at King's College, Newcastle-on-Tyne, and work has gone on there steadily. Students are being allowed to sit their final examination six months before the normal date, but otherwise there have been no changes in the course. The university diplomas in public health and psychological medicine are now both suspended, and the university offers no other diplomas. Courses are being held as usual for dental degrees and diplomas.

At Birmingham University * the subject of pædiatrics will now take an equal place with medicine, surgery and gynæcology in the final examination. Under the new regulations the final examination may be taken in two parts, the first in December and the second in the following June; the subjects of the first two are gynæcology with obstetrics, and pædiatrics; those of the second part medicine, psychological medicine, surgery, and ophthalmology. As a war measure, a student may if he likes take both parts of the examination in the December of his final year. During the past year the reader in pharmacology has been advanced to the status of a professor, partly because of the growing importance of the subject, and partly because of the distinguished work accomplished by the reader.

Owing to the generosity of the Nuffield Trustees who have placed at its disposal the sum of £1500 for a period of ten years, the university is about to proceed to the appointment of a Professor of Social Medicine. There are great opportunities for the study of industrial medicine in this area, and coöperation between the Accident Hospital and industrial medical officers has been efficiently organised, so that industrial medicine is likely to be one of the major interests in the new department. In common with all medical schools

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* The entrance requirements for the Universities of Manchester, Liverpool, Leeds, Sheffield and Birmingham have been modified since the beginning of war; they may be obtained from the Secretary, Joint Matriculation Board, 315, Oxford Road, Manchester. The faculty entrance requirements differ in each case from those of the university; they can be obtained from the Dean of the Faculty of Medicine in each university.

Birmingham continues to receive many more applications for vacant places in this school than they can possibly accept. Actually with the depleted teaching staff it would not be possible adequately to teach more students than the quota allowed by the Ministry of Labour. The dental school is as successful as ever

LIVERPOOL UNIVERSITY * has carried on with no [illegible] held [illegible] their [illegible] complete their statutory classes so that during their final year they can take resident posts in hospitals. The school of dentistry is working as usual and there [illegible] en no changes in the [illegible] ental examinations. [illegible] diplomas in medical [illegible] and in public health are at present suspended. The courses for the diplomas in [illegible] hygiene will be held if [illegible] about them will be made [illegible] medical and dental courses may be obtained from the Dean of the Faculty of Medicine, University of Liverpool.

At the UNIVERSITY OF MANCHESTER * the curriculum committee has arranged matters so that the sixth year of training is entirely free from university classes, and the students concentrate on hospital work, and take house appointments. The clinical years have been reorganised so that st[illegible] experience in April and [illegible] coordination of systematic teaching and clinical experience and observation. The systematic teaching of pathology is now begun immediately after the student has passed in anatomy and physiology, and this is felt to be an important step forward. Instruction in pharmacology is to be given concurrently with teaching in pathology and bacteriology, and courses in anæsthetics and therapeutics are to form part of the pharmaco[illegible] November, 1942, a large proportion have been examined radiologically and given a Mantoux test, beginning with those in the final year There is an active dental school. Manchester may fairly claim to produce well hardened plants which have succeeded, and may hope to go on succeeding, in most soils.

At the UNIVERSITY OF LEEDS,* last year, the clinical period was reduced from 36 months to 30, as recommended by the Ministry of Health, but this reduction, effected at short notice, has unavoidably put a heavy burden on final year students To ease the strain and relieve congestion in the later stages of the course, the curriculum has now been adjusted so as to allow them to take earlier the examinations in pathology and bacterio[illegible]s them to spread [illegible] over a period of [illegible] into six months, as was necessary under the first emergency scheme In April, the university was to have introduced a new term, between the 2nd MB examination and the start of clinical work, for the study of introductory general pathology and bacteriology, pharmacology and pharmacy, and physical signs As this would have entailed a lengthening of the medical course by three months, it has been postponed until after the war. The numbers applying for admission t[illegible] of them women from the [illegible] be greatly in excess of the p[illegible] gistration course has therefore been restricted to those who have been unable to study physics and chemistry at school, and candidates may no longer take this examination from school. The maximum number of places in the medical course is thus secured for students who have obtained a higher school certificate with chemistry, and either physics or botany, at principal standard.

At the request of the Ministry of Health, Leeds has suspended all postgraduate courses The DPH course and examination, like those for the DPM, are in abeyance for the duration of the war. In dental surgery Leeds offers the degrees of BCH.D and MCH.D, and the LDS diploma The normal course for the LDS lasts five years. The BCH.D course is identical, except that a further six months period of clinical dental study is required, and of course the standard of the examinations is higher Qualifications for entry to the BCH D course are similar to those for other degrees courses, the entrance requirements for LDS are a school certificate with credits in English, another language, a science and a fourth approved subject. For both, mathematics up to school certificate pass standard is essential. Concessions are made to students who have obtained a higher school certificate with chemistry and physics at principal standard and to others who have completed not less than two years pupilage to a registered dentist The regulations for the MCH D degree are in process of revision.

At the UNIVERSITY OF SHEFFIELD,* until the present session, the medical curriculum had not been curtailed, since it was felt that the standard of medical education should be maintained if possible, and that from a small school the numbers joining the ranks of registered practitioners each year are so few that advancing their date of qualification could not materially benefit the national effort. To conform with the practice in other medical schools, however, a revised time table for students in the 5th and 6th years has now been drawn up, and students due to qualify in March, 1944, will do so in December, 1943, while students due to qualify in March, 1945, and thereafter will qualify 6 months earlier. The scheme enabling the present final year students to qualify 3 months earlier has been made possible by telescoping the lectures given during the last 6 months of the usual course and by depriving the students of the final 3 months' revision period No clinical appointments have been deleted. The second scheme, whereby the course is shortened by 6 months, introduces a summer vacation term for 5th year students which begins only a few weeks after they have completed their 4th year course, and curtails the final medical and surgical appointments and the final revision period These arrangements are only an emergency measure, and as soon as possible after the war Sheffield will revert to its original curriculum.

The university offers no medical qualification other than the degrees of MB, CHB, CHM, and MD Owing to the present quota-system, and the large number of applications received each year, the faculty of medicine cannot now accept students who are not qualified to enter on a degree course; students, who have completed their preclinical work at Oxford or Cambridge are, however, admitted for clinical work. Because of the shortage of resident hospital staff students in the final year are gaining valuable experience in hospital posts for short periods. Arrangements have also been made for students to be in residence at the Children's Hospital for at least three weeks during their children's diseases appointment This valuable innovation is in addition to the usual resident period of one month during each of the final medical and final surgical appointments and the usual two months during the midwifery appointment.

There have been no changes in the dental degrees or diplomas of the University The number of entries to the dental school promises to be substantially increased next session and would, no doubt, be even greater had the war not interfered with the building of the new dental hospital, the plans for which have long been completed.

At BRISTOL UNIVERSITY as elsewhere, the curriculum has been temporarily compressed to meet the national need for doctors, so that students who wish to do so may sit for the final examination six months earlier than would normally be allowed. This has been achieved by including an extra term of lectures, lasting 6 weeks, in the long vacation between the fifth and sixth years of the curriculum. In memory of Dr. Edward Fawcett, emeritus professor of anatomy, who died during the year, his family has founded a memorial prize in anatomy. St Andrew's studentships in neurology and psychiatry have also been founded for medical graduates of the university, and are tenable at the Burden Neurological Institute. Two second-year medical students h[illegible] ls for rescuin[illegible] d taken fire. [illegible] usual.

Other Schools in the United Kingdom

The WELSH NATIONAL SCHOOL OF MEDICINE, like other schools, finds some difficulty in planning schemes of study to meet the exigencies of war and yet keep pace with the rapid developments of medical science. The shortened curriculum, has come into operation, as a result of which the clinical period has been reduced from 33 months to 30; the quality and content of the teaching has been maintained however. In April a third final examination was held in addition to the usual June and December ones. Selection of students next October is in the hands of a university selection committee which interviews every applicant; some 44 students have to be chosen from over 200 applicants. The anatomy department has experienced a shortage of subjects. This appears to be a difficulty common to all schools and calls, the Provost feels, for common action.

Student house-officers continue to give a satisfactory account of themselves. While holding such appointments students are spared from the wards for such formal courses as they may still need to take. Requests for such officers come from hospitals elsewhere and the appointments are made when possible, provided the receiving hospital guarantees tuition. The beds of the medical and surgical units, some 120 in all, are still at Whitchurch EMS Hospital, about 4 miles from the Cardiff Royal Infirmary. They are satisfactory, but time is consumed by travelling, and there are little difficulties because parts of the units are still at the infirmary. Steps are being taken to bring the medical unit beds back near to the Rockefeller buildings. Some difficulties have to be overcome in finding alternative sleeping quarters for nurses and securing domestic staff—a real problem. Outpatients sessions have been shifted from afternoon to morning since the start of the war. Half the outpatients come from the coal-valleys and they want to get back before it is dark, so there have been many student time-table alterations. The students' hostel and refectory are increasingly successful. Houses are being acquired around the main building (itself made from adapted houses) so as to provide more sleeping room, and it is hoped that after the war the houses will be replaced by a big new building designed for its purpose. The site is certainly fine: quiet, equidistant from infirmary and school buildings and close to both.

Steps are being taken to improve the teaching in tuberculosis—a proper move in a school which has a full-time professor of tuberculosis and values the teaching provisions of the Welsh National Memorial Association. Annual physical examination of the clinical students continues, with radiography in every case. The university plans to extend such examination to all its students, and this undertaking will be organised by the school.

There have been requests for chairs of psychiatry and of pædiatrics. New buildings to arise on the infirmary site are the radio-therapeutic institute, designed to fulfil the provisions of the Cancer Act and a new tuberculosis building. The prewar infirmary centenary appeal, when implemented, will mean considerable rebuilding to provide 600 beds, a new obstetrics and gynæcology department, a nurses' home, additional school premises and other additions. The new pathology building is in good use but awaits completion. The school, in association with the Welsh College of Pharmacy of the Cardiff Technical College, gives instruction for the degree of bachelor of pharmacy; the number of students is increasing and a new institute of pharmacology is required. The school prepared for the university a report for the Interdepartmental Committee on Medical Schools and has given oral evidence to the committee. Young and growing, the Welsh School faces many problems. It is happy to find how interested and helpful students and their gatherings are in its work and progress.

For the last two years at ABERDEEN UNIVERSITY extra terms have been introduced into the summer vacations for fourth and fifth year students, and the curriculum has been expedited to allow the annual crop of doctors, as the dean puts it, "to be gathered (not plucked) in the autumn." This has necessitated changing the dates of the final examination from June to September, and from [illegible]mber to March. The policy has worked well and [illegible] continued while the war lasts; whether it will be carried afterwards has still to be decided. "It imposes" he says, "a certain strain on student and teacher alike; and it is doubtful if the clinical teacher in the Scottish schools, where formal instruction is carried on every day during terms, can retain his freshness and vigour if he has to be a pedagogue during vacations as well." The men students are rather heavily weighted with military duties, but manage to do their work in spite of that.

In the UNIVERSITY OF EDINBURGH the war has not seriously affected the medical degree courses, and in spite of depleted staff it has been possible not only to maintain teaching at prewar levels, but to improve and extend instruction on child life and health. During the last three years clinical teaching in infant health has been given at the maternity pavilion of the Royal Infirmary, on newborn babies and of infants attending the hospital clinic. This course has been extended and the full programme of teaching in child life and health will now consist of 20 systematic lectures, a clinical course of 3 months (50 meetings) in diseases of children at the Royal Hospital for Sick Children, and the new clinical course in infant health (20 meetings) at the maternity pavilion. The faculty has also recommended that the subject be given a separate place in the final examination. These new arrangements give effect to the recommendation of the GMC that in the final examination there should be a test of the candidate's knowledge of infant hygiene and of diseases in children. For two years, now, psychiatry has been a separate subject in the final examination.

The gift of the rector of the university of a large area of ground, covering some 25 acres, together with three large mansions has made some interesting changes possible. The first of the houses, with 11 acres of ground, is to be a hall of residence for women students; the second, with 13 acres, a hall for men. The third, together with some smaller houses, may be used as residences for the principal of the university and other members of the university administrative or teaching staff or for other purposes of the scheme. The site is readily accessible from the university buildings and lies to the south-east of the Old College. A considerable block of buildings lying close to the Old College and the New Buildings will also be utilised and reconstructed to provide accommodation for student societies and for enlarged and consolidated premises for the general activities of the student body. Thus the university can look forward to a long programme of development in social life.

SURGEONS HALL, the School of Medicine of the Royal Colleges of Edinburgh, is a teaching body only and holds no professional examinations of its own; but it offers a complete medical curriculum for the qualifying examinations of the Scottish, English and Irish Conjoint Boards; and some of its lectures are recognised for students taking university degrees. Systematic classes are held in Surgeons' Hall, the New School, and the Royal Dick Veterinary College; the clinical teaching is provided in the main at the Royal Infirmary, and to some extent at other hospitals. Work has gone on uninterruptedly during the war without curtailment and it is not anticipated that there will be any new difficulty arising until the war is over.

At GLASGOW UNIVERSITY it has been possible to continue medical teaching on normal lines. Many of the younger teachers are on active service, and those who remain are adding part-time national service of some kind to their teaching duties. Patients in the hospitals are somewhat fewer, but numbers have been adequate for teaching. First, second, third and fourth year students are required to serve in the Senior Training Corps but matters have been so arranged that any notable interference with study is avoided. They also undertake fire-watching in the university. The senior students have been serving as clinical clerks in the EMS during vacations and have also been appointed in increasing numbers as unqualified residents in teaching and other hospitals. Arrangements have been made to hasten qualification of medical students by advancing the dates of the final examinations three months. At present there are 1042 students in the medical school, of whom about a fifth are women. There are no dental students in the university. The course for the diploma in public health has been suspended until after the war. The university caters not only for undergraduate instruction but for higher study and research.

ANDERSON COLLEGE and ST. MUNGO'S COLLEGE have separate foundations from Glasgow University. Anderson College receives about 700 students a year; courses are given in all preclinical subjects, and clinical training is given at all the hospitals open to university students. The course prepares candidates for the examinations of all the licensing boards and for the university examina-
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it stands. It takes 300 students, preclinical courses being given in the college and clinical training in the wards of the infirmary and the special hospitals of the city. Students are prepared for the examinations of the licensing boards and for the examinations of the universities, provided matriculation requirements are met. Further information may be had from the Dean, St. Mungo's College Medical School, 86, Castle Street, Glasgow.

At ST. ANDREWS UNIVERSITY everything continues as usual except that in response to the government appeal the date of qualification for students graduating in 1944 has been expedited. The June examination has been advanced to March and the December examination to September, and a full teaching term—the Lammas term—beginning this year on July 12, has been introduced. This is not an unmixed advantage, because most of the students used to do resident clinical clerkships, or some other work which they did not ordinarily undertake in term-time, during the last long vacation, and of course this outside experience is now lost. Nevertheless some still manage to help with special work, for example with the regional blood transfusion services, so that the regular staff can take some time off without cutting down the work of the unit. Applicants for admission to the medical school exceeded 270 this year, the 65 places allowed under the quota. The dean suggests that some of the surplus medical applicants might go over to dentistry; many more dental surgeons are needed, and there are vacancies for both men and women in the dental schools. The difficulties of a scanty staff are increased by the continual growth of new duties. The standard of work among the students has not suffered, however, as examination results show.

Despite the fact that Northern Ireland is not included in the conscription, the main difficulty of QUEEN'S UNIVERSITY OF BELFAST has been the absence of many younger members of the staff on war service; nor have the students been behindhand in joining the Forces. The older teachers, including some of those who had retired, have taken on the extra work. The number of students admitted to the faculty of medicine is limited to 100 in any one year; the course normally covers six years, but while the war lasts the course can be completed in five years and six months. The dental school is working as usual. Full information may be had from the Secretary, Queen's University, Belfast.

At TRINITY COLLEGE, the UNIVERSITY OF DUBLIN, in the spring of this year students who had completed their course except for three months hospital work were allowed to sit for their finals. Each of the five who qualified, under this dispensation, had a particularly good record. Nevertheless the university has decided not to allow students who have not completed their hospital attendance to sit in future, partly because so few gain from the relaxation and partly because the atmosphere of haste and excitement among the students is not conducive to the best work. A scheme has been drawn up during the year under which future medical students will be examined for tuberculosis by miniature radiography and skin tests; this will be compulsory. Students will be examined in their premedical year, and radiographed again at the beginning of their clinical work and in the final year. For the past two years premedical students have taken an intelligence test (group test 33 of the National Institute of Industrial Psychology). These tests will be continued and later the results will be compared with the progress of the student through the medical school. All the ordinary departments of the school are working as usual, though the numbers of students are fewer and there has been an increase in the proportion of women students. The dental school is unaffected.

The SCHOOLS OF SURGERY, including Carmichael and Ledwich Schools, are attached by charter to the ROYAL COLLEGE OF SURGEONS IN IRELAND. They are carried on within the college buildings at St. Stephen's Green, and are supervised by the council of the college. Lectures and courses may be attended by medical students who
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obtained from
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Ireland, Dublin.

In the three colleges of the NATIONAL UNIVERSITY OF IRELAND—University Colleges of Dublin, Cork and Galway—the war has caused no great changes. A diploma in child health has lately been introduced in University College, Dublin, but the course is still under consideration; numbers have been maintained, and the extension of the anatomy and physiology courses to cover six terms instead of three, as in the old curriculum, has been found to be a great improvement. There are dental schools at Dublin and Cork but not at Galway. Regulations governing medical and dental examinations and courses are unchanged and may be obtained from the Registrar, National University of Ireland, 49, Merrion Square, Dublin.

Degrees and Diplomas

EXAMINING BOARDS

English, Scottish and Irish Conjoint Boards

diplomas of MRCS, LRCP. Candidates satisfying the board's regulations in regard to the preliminary examination in general education, are eligible for admission to the premedical examination in chemistry, physics and biology, and are required to complete the professional curriculum subsequently at a recognised medical school.
As an emergency measure tl
been reduced from 57 to 51
now admissible to the last sub
after 30 months of clinical study instead of 33. The regulation permitting a candidate to enter for one part of the final after 24 months of clinical study is not affected. Some other war-time concessions have been authorised
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Edinburgh, or Glasgow, or both, the student may obtain the diplomas—designated by the letters LRCPE, LRCSE, LRFPSG—of all three bodies. Candidates may work for the examination of the Scottish Conjoint Board at any of the recognised medical schools of Great Britain and Ireland. In 1938 the Triple Qualification committee of management adopted the suggestions of the General Medical Council for an extended medical curriculum, under which the course was to consist of a year of premedical work followed by a five-year medical course; but the committee have reverted to the 1937 regulations as a temporary war measure. Under these, the course lasts only five years and includes, in addition to the pre-registration examination, four professional examinations: the pre-medical examination (biology, chemistry and physics); the second examination in anatomy and embryology, physiology, biochemistry and biophysics; the third in pathology and bacteriology, and pharmacology; and the final in medicine, surgery, midwifery, forensic medicine and public health. Details may be had from the registrar, 18, Nicolson Street, Edinburgh.

The Conjoint Board of the Royal College of Physicians of Ireland and Royal College of Surgeons in Ireland accept candidates for the LRCPI and LM, LRCSI and LM from most of the recognised medical schools at home and abroad. During the year 1943, 2½ years of clinical work are being accepted from entrants to the licentiate examinations instead of 3. There have been no other changes in the regulations since the outbreak of war. Full details can be obtained from the registrar, Royal College of Surgeons in Ireland, Dublin.

Apothecaries' Licences

The Society of Apothecaries of London grants the LMSSA Lond. to candidates who pass in the primary examination (which is held quarterly) and the final examination. Final examinations are held monthly except in September. The minimum period of study is normally 5 years, but as a war-time measure candidates will be allowed to sit for the primary examination in anatomy and physiology after 46 weeks' study, provided that this covers a period of not less than 15 months; that is to say, the candidate can sit after four terms work instead of five, and this will save him a term on the whole course. The four parts of the final examination may be taken together or in any order. Further information may be obtained from the registrar, Apothecaries' Hall, Black Friars Lane, E.C.4.

The Apothecaries' Hall of Ireland grants the LAH Dubl. to students who pass the three professional examinations. No changes have been made in the regulations, which can be obtained from the registrar, 95, Merrion Square, Dublin.

UNIVERSITY DEGREES

Bachelor of Medicine and Surgery

All the universities in the United Kingdom offer baccalaureate degrees in medicine and surgery, conferred on the results of examination.

HIGHER QUALIFICATIONS

Those who have graduated in medicine and surgery are at liberty to seek higher qualifications if they wish.

Doctor of Medicine and Master of Surgery

Graduates holding a bachelor's degrees can take the degree of Doctor of Medicine or Master of Surgery. All the universities in Great Britain and Ireland confer such degrees. The requirements vary and can be obtained from the different universities. At the University of Durham the degree of Doctor of Surgery (D Ch) is offered in addition to degree of Master of Surgery (MS).

Master in the Science of Obstetrics and Master of Midwifery

The Irish universities grant the degree MAO. The Society of Apothecaries of London offers Mastery of Midwifery (MMSA). The degree is given on the results of an examination, held in May and November, the requirements for which can be obtained from the registrar, Apothecaries' Hall, Black Friars Lane, E.C.4.

MEMBERSHIP AND FELLOWSHIP

The Royal College of Physicians of London confers the Membership (MRCP), which is obtained by examination, and the Fellowship (FRCP), which is an honorary distinction. Medical graduates and licentiates of the college over the age of 23 are at liberty to enter for the Membership examination, details of which can be obtained from the secretary, Royal College of Physicians, Pall Mall East, London, S.W.1.

Fellows are selected annually. from the ranks of members, by the council of the College.

The Royal College of Surgeons of England grants a ship to those passing the primary and final FRCS examinations. Under new regulations which become effective from the end of 1943, undergraduates will no longer be permitted to take the primary examination, which will only be open to members of the College and graduates in medicine and surgery of universities and medical colleges recognised by the council. Subjects of the primary examination will be anatomy (including normal histology), applied physiology and the principles of pathology. No candidate will be admitted to the final examination unless he can produce evidence of having been engaged in acquiring professional knowledge for not less than 2 years after taking a recognised medical qualification. Dates of examination have been rearranged so that candidates who pass the primary examination can proceed at once to the final if they are eligible. Copies of the new regulations and full particulars may be obtained from the director of examinations, the Examination Hall, Queen Square, London, W.C.1.

Medical graduates who have been registered, or eligible for registration, for at least three years, may apply for examination for Membership of the Royal College of Obstetricians and Gynæcologists (MRCOG). Particulars of the regulations may be obtained from the secretary, Royal College of Obstetricians and Gynæcologists, 58, Queen Anne Street, London, W.1.

The Fellowship (FRCOG) is granted to Members who are judged to have advanced the science and art of obstetrics and gynæcology.

Graduates may become Members of the Royal College of Physicians of Edinburgh (MRCPE) on passing an examination, particulars of which may be obtained from the secretary, 9, Queen Street, Edinburgh 2.

The Fellows are selected annually from among the Members by the council of the college, and receive the degree of FRCPE.

Fellowship of the Royal College of Surgeons of Edinburgh (FRCSE) is granted to medical graduates who pass the required examination; particulars of the regulations may be obtained from the clerk of the College, Surgeons Hall, 18, Nicolson Street, Edinburgh.

The Royal Faculty of Physicians and Surgeons of Glasgow grants, after examination, a Fellowship registrable by the GMC as an additional qualification (RFPSG). Admission is by examination and subsequent election. The candidate, who must be a licentiate of the faculty or a graduate in medicine of a university or medical college approved by the faculty, may be examined either in medicine or surgery, as he chooses.

A candidate presenting evidence of having practised a specialty for at least 7 years may be examined in that special subject if the council of the faculty approves. A candidate may also submit original published work, and if this is of sufficient merit he may be excused part of the examination. Details may be sought from the secretary of the Royal Faculty of Physicians and Surgeons, 242, St. Vincent Street, Glasgow, C2.

Membership of the Royal College of Physicians of Ireland (MRCPI) is granted on the result of an examination, the details of which may be obtained from the registrar of the College, 6, Kildare Street, Dublin.

Fellows are elected by ballot, and receive the degree of FRCPI.

Graduates seeking the Fellowship of the Royal College of Surgeons in Ireland (FRCSI) must pass in two examinations, a primary in anatomy and physiology and a final in surgery. Further particulars may be obtained from the registrar, the Royal College of Surgeons in Ireland, Dublin.

The Faculty of Radiologists offers a Fellowship (FFR) to medical graduates of five years standing who have spent at least one year in general clinical work at an approved hospital, have practised radiology exclusively for three years and have held a radiological diploma for at least two years. Candidates are required to pass an examination and submit a thesis. Candidates who hold higher medical or surgical qualifications may be exempted from the examinations in general medicine, general surgery or pathology. Full particulars may be obtained from the warden, the Faculty of Radiologists, 32, Welbeck Street, London, W.1.

SPECIAL DEGREES AND DIPLOMAS

The regulations for the following diplomas can be obtained by applying to the examining bodies concerned.

Public Health

A diploma in public health (DPH) is granted by the English and Scottish Conjoint Boards and, usually, by all the universities [illegible] ord, Cambridge and [illegible] the diploma, offers [illegible] to medical graduat [illegible] who attend courses f [illegible] m; the degree of doctor of hygiene is conferred on those holding the B Hy who submit an approved thesis and pass in an oral examination.

Courses for the DPH are at present suspended, however, at all universities except the three colleges of the University of Ireland, at Dublin, Cork and Galway. The Royal Institute of Public Health and Hygiene normally holds a course, and in the coming session it will be held as usual for any candidates who are eligible for enrolment under war-time requirements; but advertisements of the course are not being issued at present.

Psychological Medicine

The Universities of London, Durham, Leeds, Manchester, Edinburgh, Belfast, Dublin (Trinity College), Ireland (National University) and the English and Irish Conjoint Boards normally offer diplomas in psychological medicine. The University of London also grants a diploma in psychology, taken chiefly by social workers, the course for which is still being held at the London School of Hygiene and Tropical Medicine. The courses for the diplomas of Durham, Leeds, Manchester and Belfast Universities are at present suspended, and at Edinburgh no regular courses have been given recently and future courses will depend on the demand and on the staff available. A DPM course is held annually at the Maudsley Hospital in the early months of the year; information may be obtained from the honorary director of the Medical School, Central Pathological Laboratory, West Park, Epsom, Surrey.

Radiology

The Faculty of Radiologists grants a fellowship (FFR) which has already been mentioned. The Cambridge diploma has been given up. The Universities of London, Liverpool and Edinburgh and the English Conjoint grant the DMR. Courses for the diploma at Liverpool University are at present suspended, and it has not yet been decided whether the London University course will be held in the session 1943–44, but the Edinburgh course has been held as usual and will be continued.

Tropical Medicine

Liverpool University grants a diploma in tropical medicine (DTM) and tropical hygiene (DTH) but no further courses will be held at Liverpool while the war lasts. The University of Edinburgh and the English Conjoint Board normally grant a diploma in tropical medicine and hygiene (DTM&H). No regular courses for the Edinburgh diploma have been held recently, and future courses will depend on the demand and on the staff available. Examinations for the English Conjoint DTM&H have been cancelled until further notice.

Gynæcology and Obstetrics

The Royal College of Obstetricians and Gynæcologists grants a diploma (DRCOG) to practitioners who have had special postgraduate experience in obstetrics. The University of Dublin also offers a diploma (DGO) for which a course is held at Trinity College and the Rotunda Hospital. The degree of MMSA granted by the Society of Apothecaries of London has already been mentioned.

Ophthalmology

Three examining bodie [illegible] mology—the University o [illegible] English and Irish Conjoint [illegible]

Laryngology and Otology

The English Conjoint Board offers a diploma (DLO) for those who have made a special study of the ear, nose, pharynx and larynx.

Anæsthetics

The English Conjoint Board offers a diploma in anæsthetics (DA). Candidates must have special experience in giving anæsthetics. The Irish Conjoint Board has also established a diploma in anæsthetics, the first examination for which was held last December.

Child Health

University College, [illegible] a diploma in child [illegible] consideration, and at [illegible] are medical graduates of the National University of Ireland. Diplomas in child health (DCH) are also granted by the English and Irish Conjoint Boards.

Tuberculous Diseases

The University of Wales normally grants a diploma in tuberculous diseases (TDD) but courses and examinations are at present suspended.

Bacteriology

Diplomas in bacteriology are ordinarily granted by the Universities of London and Manchester. The course for the London University examination would normally be held at the London School of Hygiene and Tropical Medicine, but has been suspended during the war. At Manchester both the course and the examination have been suspended.

Clinical Pathology

The University of London normally offers a diploma in clinical pathology (DCP), for which a year's course of study is required. Though the course is not officially suspended no candidates have so far registered for it in the coming session.

DENTAL DEGREES AND DIPLOMAS

There are schools of dentistry at the universities of London, Durham, Birmingham, Liverpool, Manchester, Leeds, Sheffield, Bristol, St. Andrews, Belfast and Dublin; and at university colleges of Dublin and Cork in the University of Ireland. Leeds grants a diploma (LDS), a baccalaureate degree (B Ch D) and a mastership (M Ch D). London grants a BDS and prepares students for the LDS of the Royal College of Surgeons. The University Colleges of Dublin and Cork grant a BDS and an MDS, and Trinity College, Dublin, offers a B Dent Sc and an M Dent Sc. All the other universities mentioned offer LDS, BDS and MDS degrees; St. Andrews offers a diploma in public dentistry (DPD) in addition.

Licences in dentistry are also granted by the Royal Colleges of Surgeons of England and Edinburgh, the Royal Faculty of Physicians and Surgeons of Glasgow, and the Royal College of Surgeons in Ireland.

Candidates for the LDS of the Royal College of [illegible] required to pass a preliminary [illegible] education, and either the pre- [illegible] chemistry, physics and biology conducted by the Examining Board in England, or an examination accepted by the board as exempting from this examination. The course lasts four years and must be taken at recognised dental schools and hospitals, but candidates who have completed not less than 6 months dental mechanics under a competent dental practitioner may be exempted from 3 of the 20 months instruction in this subject at the dental school. Regulations and a calendar showing the dates of the examination may be obtained from the director of [illegible] Examination Hall, Queen Square, London, W.C.1.

[illegible] in scientific subjects (physics, chemistry [illegible] The professional course lasts four years [illegible] taken at a recognised dental school. [illegible] professional examinations, the first [illegible] and physiology, the second in [illegible] in dental mechanics, and the final [illegible] medicine, surgery and [illegible] and bacteriology; part II [illegible] siology, surgery, [illegible] pathology and [illegible]

In addition to the LDS the Royal Faculty offers a higher dental diploma (HDD) to registered dentists who have practised for at least 12 months and who pass an examination in dental anatomy and physiology, dental surgery, and dental pathology and bacteriology. Information about both examinations may be sought from the secretary to the Faculty, 242, St. Vincent Street, Glasgow, C2.

The course for the LDS of the Royal College of Surgeons in Ireland lasts for 5 years, and up to the end of the fifth term lectures and examinations are the same as those for medical students taking the examinations of the Irish Conjoint Board. In the sixth term dental students attend a dental hospital for an introductory course in dental mechanics, and in their third year they take the same course and examination in pathology as the medical students, and attend lectures and clinical courses at a general hospital in medicine and surgery, sitting for an examination in these subjects which of course differs from that of the medical students. Their fourth and fifth years are spent entirely in the dental hospital. Details may be obtained from the registrar, *Royal College of Surgeons in Ireland, Dublin.*

REGISTRATION

No-one is a *legally qualified* medical practitioner unless his name appears on the Medical Register kept by the General Council of Medical Education and Registration of the United Kingdom. The council is a standardising body, ensuring that there is a definite minimum of medical education and examination requirements and it is responsible for discipline within the profession. Any application to be admitted to a school of medicine on beginning the medical curriculum proper should be addressed to the dean or other appropriate authority of the school to which the applicant desires to be admitted.

The number of students admitted to British medical schools during 1941–42 was 2310. The entry for 1942–43 is estimated at about 2430. The quota imposed on admissions to medical schools is likely to maintain numbers at about the same level while the war lasts. The names of 3556 doctors were added to the register in the year ended Dec. 31, 1942, 911 of these being placed on the temporary list.

IN THE COMMON ROOM

where deans and students meet

MEDICAL education in the present day is constantly being criticised on one particular score—namely, that students are taught on rarities and that those who become general practitioners are poorly equipped to treat the minor ailments and the chronic disorders which form so large a part of general practice. This criticism is well founded and in my opinion there are only two ways of meeting it. First, the extension of teaching hospitals enabling them to take their share in the treatment of the chronic sick; this can only be done by increased accommodation or by a functional union of teaching hospitals with municipal hospitals and public assistance institutions. I have recently in the course of a hospital survey seen the conditions under which the chronic sick are treated and which are sometimes a disgrace to our country. If acute hospitals made provision for chronic sick, or if admissions were made to chronic sick institutions via a general—and particularly a teaching—hospital, not only might quite appreciable numbers be saved from the ranks of the chronic sick, but students could receive instruction in their care which would be valuable to them in private and in institutional practice. Secondly, I think the student should visit sick people in their own homes either as a sort of apprentice to a general practitioner (who for this purpose might be on the staff of a teaching school as a teacher in domiciliary medicine and surgery) or by being attached for this purpose to a health centre.

* * *

A bee in my bonnet—the problem of selecting medical students. I gather from a number of quarters that the importance of an *interview* is being stressed more and [illegible] Yet when I have challenged several proponents [illegible] criteria which they will employ to decide at the interview whether a youth or maiden of 18 will be a good doctor, I have so far failed to get any satisfactory answer. I plump for a competitive examination, provided the range of subjects from which the candidate can choose any four or five is sufficiently wide. By this means you can provide a test of certain qualities which are reasonably important for the doctor of the future—viz., intellectual prowess, memory and capacity for work; and you can measure these qualities with a fair degree of accuracy. Interviews, on the other hand, can be nothing more than impressions, incapable of being measured one against the other, and bringing still in another variable—the attitude of the interviewers. I know of course that it has been alleged with regard to wine that the human brain and the human stomach are the only analysts which never make mistakes. But I am just a little doubtful about the capacity of interviewing bodies as connoisseurs of the budding doctor. And I am slightly suspicious of the interview as a weapon of prejudice.

* * *

The work of students in the STC goes on, but it is hard on the more senior men, and also on those in the second year who have to do the full infantry training. I myself think that too much is being asked of them, especially in view of the severe penalty of failure—dereservation.

* * *

The student in Aberdeen during war-time leads a rigorous existence. Not only does he do his share of fire-watching. He must also serve in the STC during the whole period of 5 years. The first two years are spent in purely infantry training, the last three in the medical unit. By the end of the 4th year he possesses Infantry B and Medical B certificates and during the 5th year receives additional instruction in the military aspects of clinical problems, including a special course in tropical hygiene. You will probably agree that the men are making every endeavour to equip themselves to meet their responsibilities, as medical officers in the Services. Even the women, though of course there is no compulsion in their case, have asked for and obtained a good deal of instruction in the medical side of military matters, which should be useful to them when they join the forces. You will also understand why some of our students feel a trifle sore when they learn that many of their fellows in the South escape all military training once the stage of clinical instruction is reached. But they don't grumble very much. The North-East has long been known as the home of an efficient and fighting race.

* * *

It was not an easy job for us students to collate opinions on the Beveridge plan. We were all too conscious of the fact that we have had practically no experience of any sort of medical service, and our carefully considered and enthusiastic proposals—whatever their nature—were inevitably met with "That's all very well in theory . . ." from one venerable member of the profession or another. But we have got to live our lives in a system whose structure is being decided now, and we feel it is our duty, rather than our right, to study, and express an opinion on, that structure. Having no responsibilities and being not yet fixed in a method of working few of us can have any axes to grind. Occasionally one of our elders has ground his axe all over us when we have asked for guidance and we have sometimes tried to reproduce the sparks at our meetings; but reheated sparks seldom do more than smoulder. Our small voice is, perhaps, unique among all the roarings of the Great on this subject. We have little experience, but correspondingly little prejudice. We are vitally affected by the future, and are still young enough and daft enough to hope and work for one that is better than the present. If we later become wiser and more cynical, we need not repent of our present deliberations.

Our Beveridge subcommittee had borne in mind the *increasing emphasis on preventive medicine and positive health;* and this necessitated examining the whole report and not merely the more directly medical paragraphs. We cannot say that social conditions are not our business, for the importance of cleanliness, sunshine and freedom from anxiety can be easily demonstrated.

THE LANCET

LONDON · SATURDAY, AUGUST 28, 1943

The Medical Prospect

MEDICINE is not simply a craft, although its practitioners must serve an apprenticeship of seven years or more; it is not primarily a career, for this, as the dictionary tells us, is a profession affording opportunities of advancement; it is both and more than these, a way of life which changes from generation to generation adapting itself to the community of which it is a part. Nowhere is this continuous flux brought out more clearly than in the lay sermon to prospective students which used to appear year by year in this position. Change of one kind or another was often its main theme. In no respect, probably, does the study and practice of medicine of the present day—wrote THOMAS WAKLEY in 1857—differ more from what it was a few years ago than in the means which modern science has placed in our hands for the observation and investigation of disease. So much for the academic side. Fifty years later a younger WAKLEY wrote: Undoubtedly medical education is in a transition condition, and whenever we have to deal with transition conditions some class or other undergoes hardship. He specifies the cruelty that follows on social transition. When these hardships are overcome, he added hopefully, others will quite possibly take their place. To bring the story up to date, the *Times* of Aug. 7 wrote of "something like an academic revolution in medicine" in the next 25 years to meet a new conception of "positive health." The claim of this generation to be transitional can indeed hardly be denied and rather than attempt from the rostrum to describe its effect on the medical prospect we have chosen to ask three unnamed diplomates of the Royal College of Physicians of London, of different age and seniority, to tell what it has meant, means or will mean to them. Here they are.

IN THE NEAR PAST

(FELLOW OF THE COLLEGE SPEAKING)

[illegible] of his day-dream. The newly called barrister similarly envisages the Woolsack.

What of the young qualified doctor? A tiny minority of medical students perhaps born and bred in an atmosphere of specialisation and generations of medical tradition may have mapped out a career. But to the large majority qualification alone is the goal, after that one is prepared to be accepted as the sport of circumstances among which the prevailing deities are Cupid and Hymen [illegible] d

Our ideals [illegible] year to year life opens out mc [illegible] of hidden possibilities, with [illegible] whole course. I would like to believe that there is no such thing as luck or chance; that some fortuitous incident at a critical moment could not be drastically responsible, but that the same end would be inevitable whatever the way of attainment, as O. Henry depicts in his *Roads of Destiny*. I wish I could believe this for it seems only just, but I can't.

Speaking for myself, I know that during my student days it seemed enough to regard a medical qualification as in itself a very great achievement. And I confess that even after many years this impression still remains. I had a vague idea that specialists and consultants pos- [illegible] qualities, and only with [illegible] that it was often opportunity [illegible] dictated a career, an explanation of the peculiar and apparently inexplicable choice in certain outstanding instances. I know that my original decision was diverted through failing to obtain a certain essential resident appointment and that I set to work to prepare myself by special qualifications for whatever might turn up.

* * *

It is difficult now to recapture the days that preceded the first Great War, when as in all other activities there was a sense of security, a feeling that once one's foot was on the lowest rung of the ladder, so long as ill health and misfortune were avoided, a certain if slow ascent was guaranteed. But that cataclysm knocked the beginner out of his stride and demanded a complete re-orientation. How often during five years of unremitting military service I pondered, with the return of peace, the indulgences which I felt I had earned. I would ride in the park every morning. In the afternoon there would be Ranelagh and sport of every kind. In the evening, the social life of a young man about town. And eighteen hours after demobilisation I was feverishly hunting hospital appointments, perturbed at the five years leeway, and feeling fifteen years older.

At that time competition was not acute. In one week I secured two appointme [illegible] have had a third, and [illegible] which five years previousl [illegible] with delight I was disappointed at just missing something outstandingly attractive and at being only runner-up for two chairs of medicine. In addition, bread-and-butter was forthcoming for all young consultants in special departments of pensions assessment.

And so a full—too full—life began. Until you are on the staff of a teaching hospital you do not realise that the purely professional side is only a small part of the obligations you accept or undertake. The professional side is to some extent a matter of conscience. One man may consider his duty well fulfilled by the four hours a week which he rather grudgingly sacrifices from his private work to devote to the care of the sick poor, while another may regard four times that allowance as all too little in the interest of philanthropy happily combined with clinical enthusiasm. Social obligations may be limited to permission to include his name and his lady's as patrons of this, that, or the other function in which they have not the faintest interest and which they have not the [illegible] nding. Alternatively, he m [illegible] several of the athletic, literar [illegible] societies which form an important part of a student's life; supervisor or even editor of the hospital magazine; and the haven of appeal for the odds and ends of emergencies and difficulties that are beyond the realm of classification. On the administrative side, he may avoid trouble by failing to present himself at a single meeting of the medical committee. Contrariwise, his patriotism may make him a regular and assiduous attendant, in which case he may be certain of a place on every subcommittee elected to deal with the thousand and one matters that crop up as problems in any school of medicine.

* * *

What was the programme in those days? Early rising was essential in order that breakfast, the only meal of the day likely to be leisured and uninterrupted, could be eaten with a proper concession to digestive needs and at least a perfunctory scrutiny of the newspaper. By 9 o'clock in the lecture theatre, and at ten minutes past 10 in the consulting-room, with letters prepared for consideration by the secretary and the first patient already in the waiting room. If no lecture, then from 9 to 10 a visit to a nursing-home or possibly a consultation in the neighbourhood. I have never found that a proper consultation with its examinations, its study of radiograms, of reports, of other opinions, and the ultimate discussion and advice can be honestly completed under an hour or, at the very least, forty-five minutes and I do not think I am slower than most people. So one was lucky to have a few minutes in hand at half past one when lunch was necessarily a refreshment and not a meal if one was to reach hospital at 2 o'clock: for a rigid insistence on punctuality is an indispensable preliminary to ensure a peaceful afternoon. It is discourteous, if not worse, to keep sister and nurses in a ward in a state of tension, and a number of students in increasing exasperation at kicking their heels about the corridors when they might be much more profitably and enjoyably engaged. If the outpatient department awaits one's belated arrival, delay is even worse. Outpatient work has in any circumstances its dark side; and outpatient work conducted in a hurry with one eye on the clock and the other on an apparently inexhaustible stream of resentful and reproachful humanity is the most fatuous formality—an affectation of usefulness, the most exasperating occupation that any educated man can undertake.

One of the numerous committee or subcommittee meetings at 5 o'clock was over in time for a consultation or a visit to nursing-homes before dinner, rather indecently hurried in order to attend a medical society, to open a discussion, give an address, read a paper, or at least take part in the proceedings. That over, the night was still young and there was a variety of occupations from which to select. First any belated correspondence must receive attention, especially in regard to patients seen during the day. Figuratively the sun was never allowed to set on uncompleted reports, or soon the accumulation grew beyond manipulation. After this there was a book to review, examination papers to mark, a lecture to prepare, an article to write, material to be selected for an address. And if and when there was nothing else, the current journals were always at hand to remind me that as a teacher of medicine I must be au fait with all that was progressing in my particular branch.

Generally I could rely on six to seven hours sleep, for emergencies were few—a sudden cardiac or pulmonary alarm, assistance in a case of severe hæmorrhage, differential diagnosis of an acute abdomen from a nonsurgical disease, decision whether a patient's general condition would permit of an immediate operation. Of course there was occasionally a sudden interference with routine by a call out of town which meant sometimes complete upheaval, but more usually only a relatively slight dislocation demanding the cancellation of a less important function or recreation and making it still possible to fulfil all indispensable obligations with the inconvenience of a scratch meal or some loss of sleep.

In retrospect this seems to have been a dreadful sort of life, one possible only to a soulless slave of routine. Yet there still seemed room for enough exercise and leisure to avoid staleness and preserve physical fitness; for enough social intercourse and recreation to avoid priggishness and a narrow outlook. But all of these were regarded as details which filled in interstices or any larger gaps which might suddenly and unexpectedly present themselves.

How was it done? By the strictest economy of time. A lecture was composed while shaving; during the otherwise wasted minutes of compulsory waiting, odds and ends were jotted down for future adaptation in articles; a great deal of reading can be done in the course of a year when travelling, especially on railway journeys. But it was a hard life. For ten years I never had a proper holiday, I could number on the fingers of one hand the occasions when I patronised a theatre, and I gratefully accepted as a rare relaxation a couple of hours at a cinema when I could fall asleep at intervals—that was before the more strident talkies had arrived. Physical discipline was rigidly enforced; strict limitation of tobacco and alcohol and even of food, while exercise was not infrequently taken at midnight. It was comforting to live on memories: of rowing in the May races, of running laps on Fenners, of climbing in the Alps, and to persuade oneself that such experiences had built up a constitution and a fortitude to serve in these exacting days.

Week-ends provided some surcease from routine but not complete relaxation. The opportunity to tidy up the rough ends of problems that had been shelved during the week was an ever-ready temptation to a hypertrophied conscience. A morbid craving to start Monday morning with a perfectly clean sheet seemed at variance with even one day of rest. No wonder my colleagues with gloomy forebodings reprobated this way of living; I should have been just as condemnatory in the case of somebody else. Psychologically considered, I might be regarded as having developed a number of conditioned reflexes and inhibitions, some of which were useful and even commendable, but as a whole contributing to a groove which differed from a grave only in being more narrow. Alternatively I was a work addict overcompensating for an inferiority sense, or—perish the thought—indulging in a form of masochism. I lacked the sense or courage to consider quality as well as quantity of output, believing that the seven-day rhythm was in my case productive of optimum results. In all probability the efficiency of the five-day worker who played throughout the week-end was substantially higher.

* * *

Two questions I may anticipate. Is all this a picturesque exaggeration? It is not. Is it representative of the average experience of those who aspired to consulting practice after the last war? That, of course, I cannot answer. I have no doubt that men of superior intellect with adequate confidence in their ability, possessing social influence and financial security, could order their lives more rationally and still attain at least the modest success and distinction which I am grateful to acknowledge. It is probably true that although the struggle may be severe and the experience embittering, the spur of necessity is the most powerful of all stimulations; and it is at least arguable that the *res abundantes domi* may be a greater handicap than the *res angustæ*. Convinced of deficiencies and aware of disadvantages, there must be a morbid tendency to compensate by extra application. This history may therefore be far from typical—but then every man's career is necessarily individual.

It has been authoritatively stated that it is easier to gain a reputation than to lose one. Well, that may be so, but I know that pride very soon gives way to vanity under the perpetual torture of having to live up to a reputation. The acquisition more or less deserved of ability as an after-dinner speaker or a versatile writer led to invitations, first regarded as requests and then interpreted as rights. And out of vanity came the weakness of incapacity or unwillingness ever to say no.

The ups and downs! There were the mile-stones with wide intervals, as is the way of mile-stones. Election to the fellowship, to the association of physicians, to examinerships. The red-letter days. The invitation to write a leader for THE LANCET. The article or lecture that earned a gratifying approbation. On one occasion an urgent call to the Riviera which, quite apart from the financial accompaniment that it would be hypocritical to ignore, brought a feeling of romance and of adventure. A week so full of engagements that it seemed legitimate to hope one had really arrived, only to be followed by the stagnation which inspired the fear that nothing would ever happen again. At that time how one envied the busy general practitioner in his more stabilised security. A brilliant diagnosis to encourage the belief that you might justly be counted among the leaders; but then the succession of failures that could not be discounted on the part of one who aspired to such distinction. There were times when it seemed folly to continue and I said in my bitterness "Better an ass that carries me than a horse that layeth me to the ground." I have even reached such depths of despair and self-abasement as to contemplate an occupation for which my mental calibre and capacity seemed appropriate—addressing envelopes.

It is as well that the General Medical Council and what the public calls professional etiquette impose limitations upon the compulsion which may be exercised to secure employment, and a salutary check to the temptation of accepting unworthy opportunities even though prepared with the ready-made excuse of the apothecary in *Romeo and Juliet*. No less heinous because more insidious, is one royal road to consulting practice which had sedulously to be avoided—a diligent reproduction of the episode of Codlin and Short. In the lean and hungry years, self-consolation was sought in the reflexion that every dog has his day. The sort of consolation needed when telephoned to at 1 o'clock by your senior requesting you to give his afternoon lecture or take his round because he had just been called to Torquay—or even Aberdeen. Superficially facetious, but inwardly sick with envy, you accept con amore whilst suggesting that he attends hospital and you undertake the long distance consultation.

It is well that we do not possess the gift of second sight. We were content to slog on, mercifully ignorant of a future, of a time when your day should have arrived but when there was no day, only perpetual night—the blackout and all its associations.

* * *

Sir James Paget, it will be recalled, analysed the careers of a thousand students at St. Bartholomew's; 23 became "distinguished." Paget had his own criteria, of course, as we all have. What constitutes distinguished success? What indeed is success at all? Is it big money? Is it the satisfaction of reflecting upon a happy useful life? Is it fame, and does fame signify public recog[illegible] profession; for the two are [illegible]? Admittedly in phenomenal [illegible] criteria seem to be satisfied, but that is to think almost of gods not men.

The man whose happiness depends upon magnificent motor-cars, large houses with splendid appointments and lavish entertaining, fishing, shooting, expensive holidays [illegible]

It is all very well to scoff at titles but there are mighty few of us who decline the proffered honour when we are ourselves concerned; and these are not merely big men but very big men for whom it would be difficult to find adequate distinction. *Dr.* John Brown is an honourable designation but "Sir John" has a pleasant sound. And Her Ladyship will have something to say about it!

Every man has his price—but how did Robert Walpole know? To me the acme of success is to earn the confidence of the practitioners who call you in, who often know as much as you do of your specialty and a great deal more about everything else. To have the regard of those seniors whose good opinion you value—their regard and occasionally their affection.

* * *

"Vieux jeu" say you. But is the medicine of the future to have the present-day emergency stamp of *utility*? Surely no bureaucracy at its worst can destroy the perpetual opportunity for one type of success—to encourage and console any and all of us in the depths of pessimism and disappointment.

> If you sit down at set of sun,
> And count the deeds that you have done,
> And counting find
> One self-denying act, one word
> That eased the heart of him who heard,
> One glance most kind
> That fell like sunshine where it went—
> Then you may count that day well spent.

IN THE CHANGING PRESENT

(MEMBER OF THE COLLEGE SPEAKING)

"MIND THE VOLCANO!"

WHEN I became a medical student just a quarter of a century ago my great-aunt Katharine said to my father "I suppose medicine is now considered a profession for a gentleman?" We all thought her very funny at the time, but once or twice since I have wondered a little. We begin with a nebulous mass of motives, mostly good ones, humanitarianism and scientific curiosity and family tradition and what not, all churned up together till none of them are recognisable, but in the stress of our student days they are overlaid by the one great object of getting qualified. Sometimes the original motives never get a chance again. By the time we have paid our dues to the Royal Colleges, the money motive has appeared. Father has gone bust at last, or inexplicably refuses to continue our allowances; or the theatre sister is showing signs of a keen desire to retire to the comparative leisure of a country practice. Fear of poverty has soon, consciously or not, become the supreme motive in many of us, so we take safe salaried jobs with pensions and never think again; or we go into practice and spoil what might be a friendly alliance by walking on tiptoe round our competitors and growling when their backs are turned; or we forget all about those schoolboy motives and head straight for the Citadel. All this is very silly, for though I have seen the wicked flourishing like a green bay tree, yet have I never seen a duly registered medical practitioner forsaken nor his seed begging their bread.

For a reason obscure to me, I have always had a lot of doctors among my patients. This has given me an opportunity for careful observation. My doctor patients and my doctor friends would deny it with an oath, but in most of them financial fear has been a powerful influence in their lives. The exceptions have been bored and disillusioned public servants with pensions to look forward to; those with private means; and a small happy band who are truly of the salt of the earth.

Sir Harley Wimpole, who runs a Rolls and gives those charming dinners to his friends in general practice, who has no time for those who cannot send him patients, charges ridiculous fees, and is not above being a GP himself if the patient is rich enough (and all because he never earned a fee till he was 30) must send his sons to Eton because he was a grammar-school boy, must send them afterwards to the 'varsity his father couldn't afford, and must put by enough for his old age, which, for a consultant, begins at 60. Dr. Mudd has never earned a fee higher than half a guinea. He works himself to the bone for his panel patients and never complains of being called out in the night to a cold in the head. He is the best loved man in the district, and enjoys a good talk, especially about shop. He never gets a chance to talk shop because all the other doctors in the district are such rogues. They steal his patients, talk against him behind his back, accept jobs from the local authorities who are always trying to whittle away his practice, and would cut his throat on a dark night if they got the chance—all jealousy, of course. By a curious coincidence all the other doctors say the same thing about *him*. The fear of an impoverished old age is upon them, though they don't always admit it even to themselves. The only thing on which they are agreed is that something must be done to force the BMA to force the Ministry of Health to give them another *3d.* per patient per annum.

[illegible] a Student's Guide, bu[illegible]nly sad when it is in[illegible] Purves-Stewart saying after discussing a differential diagnosis, "this [illegible] standing by the sick bed of medical practice, are discussing the details of the operation and the technique of its performance.

* * *

A medical service for the nation does not mean of necessity that we should all become civil servants. We can paddle our own canoe a lot better than anyone else if only we can learn to paddle in the same direction. All the talk which has been going on since THE LANCET's Special Commissioner dropped his outsize bomb four years ago[1] has resulted in the vague shadow of an agreement. It seems that what we want (and therefore will get) is not a revolution but just enough change in our present organisation to give better service to our patients and get better conditions of work for ourselves. These can come about only through greater collaboration—"group practice" if you will—and will only be possible if we get rid of some at any rate of our jealousy, which is only an aspect of fear.

This means that we must have a salary and a pension. Since whoever pays the piper is pretty sure to want to call the tune, we must be very careful who pays us our salary. We seem to have got as near to unanimity as a profession of individualists has ever got in deciding that we won't be ordered about either by anonymous clerks in Whitehall or by the local tradesmen. Even if our concentration on pounds, shillings and pence has made us suspect in the eyes of my great-aunt Katharine, we are still members of a learned profession, and, in words never used by the private soldier, " we won't be badgered about."

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[1] *Lancet*, 1939, ii, 945.

The present organisation of medicine is wasteful, expensive and inefficient, and something will have to be done about it ; but that something isn't necessarily bureaucracy. A unified medical service under a national medical council, largely elected by the medical profession, and responsible only to Parliament is an obvious and simple alternative. The officials of the Ministry of Health, threatened with government by experts who will control them instead of politicians whom they can easily control, are seriously alarmed by the idea, and like the little fishes reply, " We cannot do it, sir, because—"

* * *

The patient, in fact, is insisting on a voice in the consultation. He is pointing out that he has been fairly useful so far and would like to go on being useful in something like the same old way. The operation must not be too drastic. As the advice of the ministerial surgeon to rush the patient to the theatre and amputate his brains has apparently been outvoted, this year's students will perhaps have the final say. It will be an interesting operation and a still more interesting convalescence. " Mind you come up—the regular way—don't get blown up."

IN THE NEAR FUTURE

(LICENTIATE OF THE COLLEGE SPEAKING)

As it will be ? The old men will decide that, just as they always did. We do not even know what we want. We do not know how much we want, since money-values depend on social values—the importance attached by other people to a good address or a good school. I can imagine, if the public school system continues, deciding that I need an extra £250 a year for each of my children—which means £500 a year at the present income-tax ; and while that uncertainty remains I certainly cannot imagine what will be a fair wage-scale for the medical profession. At present I am as rich as can be on £2 10s. a week ; I just never seem to get out to spend it. But that doesn't mean a thing, except that I like it. It leaves me travelling off into one of those Utopias, Avalons, apple-islands, we travel towards all our lives, ever since we wanted to be grown up—or qualified.

That is one reason why the future does not seem to hold any concrete financial proposals ; there are others too. It is hard for my immediate generation to forget that their services have been paid for already, by the bodies of men no stronger and brains no less trained. It is difficult to say that we deserved it, even when it was part of a well-laid, state-planned calculation. We were reserved, held out of the line, while Jock (who was trained as a diplomat) took his platoon behind the enemy lines to destroy thirty-six aeroplanes and was killed by a bleeding artery on the way home ; and Michael died when he led his company on to the last objective at El Alamein (he had passed his final examinations before ordination) ; and Melvin bombed the dam when he could have stayed comfortably in the RAF in America. If such people had not given up their jobs and gone to war we should not be doctors now. It is my salutary misfortune to remember how much they entertained the world without trying, and helped the world without the special equipment of medicine.

* * *

It seems to me that in different times there are two stabilising aims in a life, the wish for friends and the wish to do well. In both of these I am confused. Friends are impermanent, outside medicine ; they are abroad or under ground. My own wish to do well was always ill-defined. In my most selfish years I had the idea of doing enormous good, or else maybe of entering a monastery and contemplating—you know, like St. John of the Cross. Then there was a time when it was important merely to have enough money to continue studying ; but it was a substance surprisingly easy to come by when the urge was as strong as that. It all leaves me not knowing what I mean by " doing well " ; my standards and my idea of success have seldom been malleable. And nowadays I cannot ask Jock or Michael what they think ought to be done. I write personally because the big realities are beyond me.

I remember a time once, though, when I knew what medicine was for ; it was in America, which I had been taught was the home of materialism. We were students in a school built by the money of some of the greater materialists, with a hospital attached whose beautiful equipment was paid for by the materialists of the town. Those were real buildings, not much like the poky, half-equipped, money-harassed place I work in now. The secretary, so far as I know, did not have to spend his time sucking up to influential people ; I cannot remember any talk about the beauties of the charity system. Living in a democracy, it was assumed that everyone ought to have the best ; even the hospital food was edible. And we were taught there that medicine was a subject with a history, and research the beauty of medicine. I expect there were a lot of disadvantages ; so many people, since I came back to England, have told me about the Americans and the bizarre treatments they think up. In those days Ricketts and Minot and Best and Harvey Cushing were the gods they held up as examples to us—and Sherrington, Lewis, Houssay and Noguchi. We were taught medicine as a priesthood, not as a trade. We worked very hard at it. When I think of my apple-island, inevitably I want to get back to that time of purpose and contentment.

Certainly the life of a successful consultant does not seem the right way. I can never see how anyone can safely be asked to earn a hard living while at the same time working for nothing in a hospital, serving on committees, teaching and helping students, and having enough free time to remain a reasonable man. That some of them—about half, as far as I can see here—stay the great men they should be increases my admiration for man. Unfortunately one more usually gets exasperated with the ones who cheat, never against their own advantage, and acquire the glory without doing the work.

But then that is negativism, and it is impossible to make a Utopia out of negations of the present. All I can deduce from these denials is that I would like to do medicine as itself, without being tempted by the money which might make me value one patient more than another, and without being led on by the desire for fame which my friends so lightly lost. State medicine, to add one more denial, seems to me a lousy answer ; we all know the nurses who only do things because otherwise matron would be annoyed, and the complex paper forms which are designed to show us how to reduce everything to a steady level of accustomed and automatic treatment. I would fit in admirably and dutifully and abominably with such a system.

We must have something better than that in my Utopia, something worthy of those friends. A system in which we can do medicine without being afraid either for our purses or for our chances of making the next step up the scale, or of a printed admonition from a man in an office.

* * *

I think that group medicine is the answer—as well as to a purely medical problem, my own inefficiency and incompetence. At present I could not serve my patients properly singlehanded. Often I can't do a venepuncture on a child ; I miss diagnoses ; it takes me too long to get a transfusion going ; I know nothing about complicated midwifery and pretty little about fractures. Yet in theory, and but for the war, perhaps in practice I should be doing all those things. It would inevitably mean that some of my patients—the ones I hadn't quite the honesty or timidity to send to my betters—suffered for my defects as a doctor. But if we worked in groups I think we should get somewhere. There would be a man who did know about the complicated fractures, and another who really liked gynæcology (fantastic), and it is on the cards that I should have a detailed knowledge of my own. We should save on equipment and surgery-space and nurses and secretaries ; but that would be nothing to the saving in the service we gave to the patients. We would take it in turns to be on at night, because no-one can function politely and efficiently if he is really tired. We might easily avoid turning into those hard-working, self-sacrificing men who labour to put into practice outworn treatments because they have no time to read of the new. I think it would be a future to like, and I don't much care what they pay me to live it

I don't know if we'll get it We might. We are a generation that the old men, and our own easiness, have deceived. But I do not think we shall fall into the nihilism and let's-laugh-at-it attitude of the indecisive years. We have seen something interesting happen: a people who were said to be slack and degenerate, rise up and fight a war, men who had fallen for the success-story throw it aside for service and death. We ought to have grown pretty tough on disaster; we are a generation that might even get what it wanted, if we knew what that could be.

We don't know I think group medicine is being slowly accepted as a good idea; we give lip service at least to the doctrine that every individual deserves the best of treatment, but the mechanism is lost in the obscurities of the future. Who is going to pay for the work we do? If the patients, can they possibly all insure themselves for the same flat rate? If the local authorities, can we keep them from messing up our task with forms and papers, and special cases and political issues? If the government, will they work it so that the patient has freedom of choice?

There it is. uncertainty. I only know for sure that I want colleagues to help me and not as rivals, time to spare for reading and walking, good enough equipment, money enough to live, and a lot more experience. Something to maintain medicine as an art and not as a trade, a background against which I can at least do some of the good my friends would have done and did These islands in the mist have always been the devil

Meanwhile I shall get down off my soap-box and see if I can't make the needle stay in for three bottles without getting blocked.

The Defence Services

THE Central Medical War Committee of the British Medical Association is responsible for the supply of all doctors for the defence services, and the Central Dental War Committee for the supply of dental surgeons.

Royal Naval Medical Service

The usual regulations governing entry of medical and dental officers to the Royal Naval Medical Service are suspended during the war and the only medical officers being admitted are those granted temporary commissions in the Royal Naval Volunteer Reserve. After the war any vacancies will probably be filled by selection of officers from among those who have served in the RNVR during the war. A small number of women medical officers are serving as surgeon lieutenants RNVR and one as surgeon lieutenant-commander RNVR (at Medical Department, Admiralty).

Candidates for the Royal Naval Dental Service must be registered under the Medical or Dental Acts and must also have a registrable qualification in dental surgery. The position respecting entry is similar to that existing for medical officers.

Royal Army Medical Corps

No applications for regular commissions in the RAMC have been invited since the outbreak of war up to the present. It is expected when recruitment for regular commissions is proposed, officers who served during the war will be considered first All war time appointments are emergency commissions for the duration of the war; no short service appointments are being made at present. Recently qualified doctors wishing to be appointed to an emergency [illegible] to the secretary of the Central [illegible] at BMA House; or if resident in [illegible] of the Scottish Central Medical War Committee, 7, Drumsheugh Gardens, Edinburgh, 3. Applicants should have held an appointment either as house surgeon or house-physician for 6 months.

Women medical practitioners are required for [illegible] he Women's Forces for [illegible] hey are required mainly [illegible] ATS. A number have been selected for specialist duties. Women must be under 16 and fit for general service. Applications must be made through the Central Medical War Committee. Applicants should have held an appointment either as house surgeon or house-physician.

ARMY DENTAL CORPS

No applications for regular short service commissions have been invited since the outbreak of war, and it is expected that vacancies will normally be filled by the appointment of officers selected from those holding war emergency commissions who want to make the Army a career. All appointments are to war emergency commissions while the war lasts, and recently qualified dental surgeons wishing to be appointed to such commissions in the AD Corps should apply to the Dental War Committee, 13, Hill Street, London, W 1, or if resident in Scotland, to the Scottish Central Dental War Committee, c/o Dept of Health for Scotland, Edinburgh, 1

Women dental surgeons are appointed to commissions in the Women's Forces mainly for general dental duties with ATS personnel They must be under 16 and fit for general service

Royal Air Force Medical Branch

Commissions in the medical branch of the RAF are now given only to those appointed to the Royal Air Force Volunteer Reserve for duration of the war. Short service and permanent commissions are in abeyance.

[illegible] doctors for interview and medical examination at the Medical Directorate, Air Ministry. Entry of doctors to commissions in the Medical Branch of the Royal Air Force Volunteer Reserve is normally in the rank of Flying Officer (corresponding to lieutenant in the RAMC) and promotion to flight lieutenant is automatic after one year's service providing recommendation for the rank is satisfactory. There are from time to time a limited number of vacancies open to doctors holding specialist qualifications, and in selected cases a higher rank on entry is given. Medical officers on entry are given a short course of instruction at the Medical Training Depot and on completion of the course become available for posting. Such postings may be to operational units, training units, recruits centres, general hospitals and station hospitals. In addition to ordinary general medical work, there are the important branches of aviation medicine and general preventive medicine and hygiene. Medical officers are encouraged to make a special study of these.

There are now 81 women medical officers commissioned for duty with the RAF as medical officers. They are mainly employed in the care of WAAF personnel

There is a separate dental branch of the RAF, and dental officers are not appointed to the medical branch. During the war dental officers are being appointed through the Central Dental War Committee, which has been organised by the British Dental Association. Entry into regular service has been suspended and all accepted candidates are at present commissioned in the RAF Volunteer Reserve for the duration of the war. There are 10 women dental officers now serving.

The Home Guard

The administrative structure of the medical service of the Home Guard has not altered appreciably since last year. Almost any practitioner will be welcome as a sub-unit officer with the rank of captain, or, if there be a vacancy, as battalion medical officer with the rank of m [illegible] adviser who [illegible], or a zone medi [illegible] responsibilities three or four times as heavy. These medical [illegible] ween the HGMS and the Army [illegible] rious Home Commands. The [illegible] his county regiment and until recently there has been nothing to distinguish him from combatant officers. He is now permitted, but not compelled, to buy for himself and to wear a cherry coloured lanyard, to which a whistle, a watch or a pedometer may conveniently be attached.

Although the administrative changes in the HGMS have been few, it has been much affected by developments on the operational side, some of which are touched on below. The general outlook of the HG has passed through an era of depression engendered by the feeling that the possibility of invasion is growing ever more remote, but this is rapidly clearing as other duties present themselves. It is becoming obvious that the HG may presently be called upon to stand alone in providing that home security to which forces in training for overseas work make so big a contribution today. The defensive mentality has been corrected by the long awaited realisation that vigorous offensive, within one's means, is often the best way of defeating the enemy. The HG is more mobile than it used to be. Gunner and anti-aircraft duties show a steady increase. Morale is consequently high and the bolder spirits are no longer content with the important rôle of beating back air-borne nuisances and coastal raids, but have longing eyes fixed on possible duties across the Channel, even if only on the lines of communication. It is most unlikely that such hopes will be realised, but they show that the HG feels sure of itself, knows its weapons, and is inclined to resent the continued existence of the English Channel.

How does all this affect the medical services ? In the first place, it increases their work, because routine medical examinations as to fitness for mobile duties are becoming a commonplace and continuous tax upon the doctor's time. Owing to shortage of petrol it is difficult to assemble large numbers of Home Guards at any one place and the doctor must often travel some distance, usually in the evening, to make these examinations. The teaching of first-aid, training of stretcher-bearers, umpiring at exercises and attending conferences also take up much time—that is, much more than they did a year ago, when it was often difficult to get anyone detailed for training, and when umpiring and exercises seldom involved the medical services. As a result of this increase of work the HG is becoming aware of a great shortage of medical officers, particularly in country battalions which may cover a hundred square miles. Many battalions have only a single MO and the average throughout the country is considerably less than 2 per battalion. There are many practitioners who fail to help the HG for reasons which appear adequate only to themselves ; some at least of these could make time to attend to the training of their local companies and platoons.

Another distinguishing feature of the last year has been the waking up of the local civil defence services, and their slow turning from a blitz mentality to an awareness of what invasion would demand of them ; but the Ministry of Health declines to let EMS doctors join the HG. Serious losses of personnel also hamper the CD services on all sides. However, there have been, up and down the country, hundreds of combined exercises in which Home Guards and Civil Defenders have cooperated, and each has benefited very much from the other's criticism, even if unspoken outside the local hostelries. In connexion with these exercises there has grown up the unexpected art of faking casualties, with papier-maché wounds and bumps, and even stumps, applied to the skin and decorated with lip-stick, paints, and horrible sanguinary solutions. A bottle of " blood " with a Higginson's syringe and a length of catheter has been used to produce realistic arterial bleeding, disconcerting to the unsuspecting first-aider, and to his clothes. The effect of a coil or two of sausage skins stuffed with cotton-wool and laid in a large abdominal " wound " must be seen to be believed. These faked casualties are displayed by persons who have been carefully instructed in the simulation of the appropriate symptoms, and are replacing the simple old labels which provided the stretcher-bearer and first-aider with no opportunity of exercising his judgment. Among CD casualties the hysterical woman is a favourite problem, but such cases are not approved in HG exercises. The need for mastering this new art will appeal to many HGMOs ; they are called upon to teach the proper symptomatology, and to restrain exuberance harmful to the integrity of uniforms.

The casualty collecting posts of the HG, which are their [illegible]ental aid posts, still vary greatly in efficiency. [illegible]as complete reliance is placed upon first-aid points and WVS houses, though many of these are so constructed that they could not even admit a stretcher case, far less look after half a dozen such cases for a day or two, as they might well be required to do. In other areas CCPs are located in empty houses, garages and the like, good enough perhaps if rapid evacuation can be guaranteed but not otherwise. The more energetic MOs have chosen inhabited houses with good means of access, and reserves of bedding and cooking utensils. It is the official view that one CCP per platoon is enough and in built-up areas this may be justified. But in the country one CCP per platoon makes it necessary to decide beforehand from what direction the enemy will attack ; the enemy may decline to abide by the rules, and if his attack cuts off a platoon from its single CCP the care of casualties will be almost impossible—or at the best will depend on improvised half measures. The plan of covering the country, where buildings are available, with a network of CCPs, so that one will always be accessible whatever the enemy does, is still the only plan to meet all possible emergencies. It must be remembered that outside villages the CD services have hardly any collecting places for casualties and depend upon the goodwill of householders. The goodwill can be counted on, but a prepared CCP is much better than any improvisation. Besides, the roads would very likely be unsafe for ambulances so that the CCPs of the Home Guard would probably have to admit many civilian casualties as well as their own.

The HGMS is thus capable of proving an invaluable supporter of morale among its own troops and the civilian population. This would be equally true in severe blitzing of communications, and in spasmodic attempts at air-borne or other invasion. Every soldier knows the extreme importance of the medical services in sustaining morale, but commanding officers often fail to realise it vividly enough until their troops are actually engaged with the enemy. This last year has shown a great increase in such realisation and the HGMOs have not failed, few though they are, to respond to the resulting calls upon their services.

Health Services at Home

EMERGENCY MEDICAL SERVICE

ALL newly qualified men and women are required to hold house-appointments in civilian hospitals for their first six months of practice. Some of the regulations affecting them have been changed since last year. Thus a man who is fit for military service may hold an A post for six months on qualifying ; if, at the end of that time he is appointed to a B2 post he will not (under present arrangements) be called up for a further six months ; and if at the end of that time he is appointed to a B1 post he will again be reserved for a further period. In this way educational opportunities are increased for selected doctors, and they are able to gain experience and training in specialties.

Casualties and invalids from the war fronts are being admitted to EMS hospitals throughout the country, and thence distributed to special treatment centres or other hospitals suitable for their care and as near to their homes as possible. At such centres students and young doctors gain experience of war medicine and surgery before joining the Forces. Rehabilitation centres have multiplied and students and house officers are thus gaining more experience in an important aspect of treatment.

Further development of special centres is limited by shortage of doctors and—even more seriously—by shortage of nurses and of domestic staff. This makes it impossible to use the reserves of beds in EMS hospitals for tuberculous cases or the chronic sick. Additional hospitals have been handed over to the American and Canadian armies, who are able to staff them.

Hospitals have been asked, wherever possible, to undertake in the outpatients department the work of first-aid posts in attending lightly injured patients who do not need admission to the wards. Experience in the past three years has shown that first-aid posts are called upon to deal with few cases, even in severe air-raids, if there happens to be a hospital with an outpatient department in the neighbourhood. The posts have therefore not fulfilled their purpose of saving the hospitals from a rush of large numbers of light casualties.

Schemes for postgraduate education have been operating during the past winter and spring. EMS officers [illegible] surgery in general hospitals or groups of hospitals It has been difficult to arrange formal courses because of the shortage of medical officers and teachers in the hospitals. Informal attendances have made it possible to [illegible] on [illegible] on burns, war wounds, hospital infections, crush injuries and other topics of immediate interest.

Salaries to medical officers are as follows:

	£
Group officer	1300
Officer in charge of surgical or medical division (hospital of 500 beds and over)	950
Surgeon or physician specialist	800
Medical officers Senior	550
Medical officers Junior	350

INDUSTRIAL MEDICAL SERVICES

THE effects of occupation on health have received increased attention during the past twenty years or so The present war with its emphasis on the output of munitions has brought the subject under a spotlight because it is becoming more and more evident that maximum output depends on the optimum physical and mental health of the wor[illegible] like all the other activities of [illegible] in a state of transition; but [illegible]nges may take, industrial or occupational medicine in the future will certainly offer greater opportunities for medical men and women.

Factories —Industrial health is at present supervised by a number of departments or organisations, the oldest of which is the factory department of the Home Office, transferred in 1940 to the Ministry of Labour and National Service. The department administers the Factories Act and the many regulations and welfare orders dealing with the prevention of accidents and illness, the regulation of the hours of work of women and young people, and the provision of amenities such as cloakrooms, washing accommodation, first aid and ambulance rooms, mess-rooms and canteens On the staff are 14 whole time medical inspectors of factories whose work largely consists in general and detailed investigations of any conditions which may affect the health and welfare of factory workers They are stationed in London, Bristol, Birmingham, Sheffield, Manchester, Liverpool, Leeds and Glasgow. Under their supervision 1725 general practitioners render part-time service as examining factory surgeons and their main duties are the medical examination of all young entrants into industry, the periodical examination of [illegible] unhealthy processes, and the [illegible] the Workmen's Compen[illegible] industrial diseases [illegible] coal-mines is dealt with by the newly expanded medical branch of the Ministry of Fuel and Power, described below.

Silicosis and asbestosis —The staff of the silicosis and asbestosis medical board has recently been increased from 9 to 11 whole time medical men stationed in Swansea, Cardiff, Stoke-on-Trent, Manchester and Sheffield where the headquarters of the board are also situated. They have special experience of chest diseases and their work is devoted to the diagnosis of silicosis and asbestosis, to the issuing of compensation certificates to affected workers, and to the periodical medical examination of workers in industries producing these conditions.

Byssinosis —It has also been established that cotton-workers suffer from occupational pulmonary conditions called by the generic term of byssinosis, and a special scheme for the compensation of the factory workers has been evolved. A medical board consisting of 3 part-time doctors was set up at Manchester in 1941 to make diagnoses and to issue compensation certificates All [illegible] schemes come under the [illegible] Office.

[illegible] —Before the war the practice [illegible] or even part-time medical officers to individual factories had not been adopted in this country as widely as in the United States of America, but there were about 50 whole-time works medical officers in various large factories throughout England, Scotland and Wales Partly as a result of the Factories (Medical and Welfare Services) Order, 1940, made by the Minister of Labour and National Service there has been a fairly rapid increase in the number of whole time and part-time medical officers in factories This order says in effect that the occupier of a factory in which any work for the Crown is being done may be required by the chief inspector of factories on behalf of the Minister to appoint doctors, nurses and welfare supervisors to look after the health and welfare of the workers. The Chief Inspector of Factories, at a Government conference on industrial health held in London in April, 1943, said that at that time there were 164 full time and 673 part-time factory medical officers Some of these are working in the Royal Ordnance factories under the Ministry of Supply Most of the newer appointments are war time ones but it is probable that many of them will become permanent after the war because once employers have experienced the benefits that a medical service can contribute to the smooth working of a factory—and incidentally to its balance sheet—they rarely abolish it

The future of the factory medical service, as a whole, is uncertain Is it to form part of the comprehensive medical service recommended in the Beveridge report and now under discussion? Two of the main criticisms of the existing factory medical services are that most of the workpeople of this country are employed in small factories to which no doctors have been appointed, and that the present works medical officers, who hold appointments mainly in the larger factories, are paid by the employers This fact leads some of the workers to suspect that the works doctor is the employers' man and that he is not free to voice his opinions about health conditions in the factories. It is thus possible that, in future, works medical officers will become the employees of the state or of some other national body

Industrial medicine is constantly enlarging its boundaries and in any event will offer to the future graduate in medicine a fruitful field of work. The medical officer in a factory, and particularly one who is interested in social problems, will find great opportunities for studying the physical and mental reactions of workers to their environment Apart from day-to-day examination of individuals who are sick or exposed to special risks the doctor can undertake the personal and general education of the workers in matters of hygiene, promote effective liaison between the factory service and the general medical and hospital services He can supervise the treatment of accidents, reduce the number of septic cases to a minimum, follow up the treatment of fractures and other serious injuries and illness, and see that all patients return to work in the shortest possible time consistent with adequate treatment and rehabilitation. He can treat cases of minor illness and injury in such a way that many of them will be able to remain at work. In war-time accidents and illnesses which keep workers, especially skilled men, away from the factory must be regarded as war casualties and a medical officer who can minimise the resulting loss of working time is doing important war work.

Facilities for training potential and newly appointed works doctors are not yet as complete as they might be, but week-end courses have been provided in London, Birmingham, Manchester, Sheffield, Leeds and Bristol. Research work into the environmental conditions in factories, in addition to the investigations made by the factory department, has been carried on during and since the last war by the Industrial Health Research Board of the Medical Research Council, and much fundamental physiological and statistical work of great value has been done. The council has recently appointed a director of industrial medical research and further important developments of this aspect of industrial health can confidently be expected.

PUBLIC HEALTH

THE public health service offers a career to medical men which is not limited by any narrow interpretation of the words "public health." The first medical officer of health, appointed in 1847, was primarily concerned with sanitation and environmental hygiene. Since the beginning of this century, when the value of preventive medicine began to be recognised, public health has advanced rapidly and its personal side has been developed in the school medical, maternity and child welfare, tuberculosis and venereal disease services. A study of vital statistics today reveals that these services have done well. In 1942 the general death-rate among the civilian population was remarkably low. Among females the standardised rate was 6·8 per 1000 living, or 8·5% better than in any previous year; this includes deaths from enemy action, and it must be borne in mind, too, that many of the healthiest young women have left the civilian population for the Services. The standardised male death-rate is 9·5, also the lowest recorded despite the considerable effects of selective recruitment on rates between the ages of 20 and 45. Child mortality which had declined by 47% up to 1939 showed a further improvement of 2% in 1942. The total number of live births exceeded those of 1941 by 67,351 and the infant and maternal mortality-rates were the lowest on record. Moreover 1942 was noteworthy for its low incidence of infectious disease.

At the beginning of the war, the hospital beds controlled by public bodies were more than twice the number of those in voluntary hospitals. To the doctor seeking a hospital or laboratory appointment the differences between service under a local authority or the Emergency Medical Service and in a voluntary hospital are diminishing.

No MOH may be appointed unless he holds a registered diploma in public health or its equivalent; but once accepted he enjoys security of tenure, in that his removal—like his appointment—must receive the sanction of the Minister of Health. Those contemplating public health as a specialist career will find that since the war institutions at which the course of training required for the diploma in public health is available have been greatly reduced (see "Postgraduate Study," p. 269). After obtaining the DPH, however, an appointment as assistant MOH and school medical officer can, under present conditions, be obtained without difficulty. The duties are mainly clinical, in connexion with the school medical service, maternity and child welfare and specialised clinics of various kinds, or in charge of beds in isolation hospitals. In the counties, the post of assistant MOH is often combined with that of MOH of a county district, which provides an attractive mixture of administrative and public health work. The higher posts are mainly administrative and the MOH of, say, a large county borough, is more in the position of the managing director of an important firm employing several hundreds of technicians than a doctor. The ever-increasing emphasis on preventive medicine enhances the importance and scope of the work of public health departments and medical officers of health.

The war has brought new problems and laid fresh tasks on the public health services, and at the same time has seriously reduced the personnel available to carry out these tasks. Recruitment is not only thinning at an ever-increasing rate the ranks of medical officers of health and their assistants, but has taken a heavy toll of essential auxiliaries such as sanitary inspectors, health visitors, and clerical officers. Evacuation of children and others to safe areas has thrown a strain on the public health staff and sanitary resources of many rural districts and made necessary the extension of schemes for sewerage and water-supply, as well as the establishment of temporary hospitals, sick bays and hostels for maternity cases and minor infectious diseases and the expansion of services already existing. Air-raid shelters used as dormitories in target areas have been supervised and improved; and the public health service has cooperated with the medical departments of the Forces in matters common to them and the civilian population, such as epidemic outbreaks, accommodation of infectious cases, water-supply and sewage disposal in camps.

The number of laboratories where specimens of all kinds can be examined has greatly increased under the auspices of the Ministry of Health's emergency laboratory service. Thus every local authority and EMS hospital has at its disposal a laboratory capable of meeting its needs.

LONDON COUNTY COUNCIL HOSPITALS

THE hospitals service of the London County Council provides not only special facilities for undergraduate instruction, but also opportunities for valuable experience for medical graduates who intend either to be general practitioners or consultants, or to make the LCC Public Health and Hospital Service their career. At the beginning of the war, the service, one of the most comprehensive hospital services in the world, contained 97 hospitals with beds for 71,694 patients. The 97 hospitals consist of 44 general hospitals, 32 special hospitals and 21 *mental hospitals and institutions for* the mentally defective; 35 of the hospitals are included in the Emergency Hospital Scheme.

Treatment is provided in these hospitals for all kinds of acute and chronic illnesses, including fevers, tuberculosis, mental and nervous disorders.

HOSPITALS BRANCH

Medical superintendents of the hospitals, who are expected to be experienced hospital administrators, receive £850 to £1650 a year, in hospitals varying in accommodation from 160 to 1300 patients. In addition, medical superintendents are provided with an unfurnished house or quarters with payment by the Council of local and water rates. The other full-time medical staff are classified as follows:

Grade	*Annual salary*
Deputy medical superintendent, class I	£650—£50—£800
Deputy medical superintendent, class II	£600—£30—£750
Deputy medical superintendent, class III	£550—£25—£650
Deputy medical superintendent, class IV	£500—£25—£600
Senior resident surgeon, physician, or obstetrician, and senior assistant medical officer	£500—£25—£600
Assistant medical officer, class I ..	£350—£25—£425
Assistant medical officer, class II ..	£250
Senior house officers	£200
House-physicians and house-surgeons ..	£120

These officers are provided with board, lodging and washing. Clinical assistants, who are non-resident, receive £150 a year with meals when on duty. Vacancies in the higher grades are filled as far as possible by promotion from the existing staff. In addition, a large number of part-time consultants and specialists are employed in the various hospitals and the establishment provides for a certain number of whole-time non-resident specialists at a salary of £1250—£50—£1500.

There was some disorganisation of the consultant service at the outbreak of war, but by February, 1940, it was again working normally, though with reduced numbers of sessions. A comprehensive pathological service has been established. There are seven group laboratories, each of which serves a number of hospitals, a central histological laboratory, and an antitoxin establishment. Attached to the group laboratories are subsidiary laboratories situated in the various hospitals. Normally a medical staff of 27 is attached to these laboratories, but some of them are at present working at other laboratories under the EMS.

TEACHING FACILITIES

During the war, courses in fever hospital administration for the diploma in public health have been suspended; other postgraduate facilities have remained as they were. The British Postgraduate Medical School is located in the Council's Hammersmith Hospital.

Patients under treatment in the Council's hospitals have not been much reduced in number, and increased use is being made of them for teaching purposes. Maternity wards of many of the voluntary hospitals have been closed, and arrangements have been made whereby maternity students have had training and experience in the maternity departments of the Council's general hospitals. Most of the students are resident and attend for a fortnight at a time. In addition, students have been allocated to a number of the general and special hospitals under the Emergency Hospital Scheme to act as dressers. The Council has agreed that medical training and experience shall be provided whenever

graduate and postgraduate students. Students are resident during their course of instruction in some of the fever hospitals.

Most of the general hospitals are recognised training centres for candidates for the University of London MD examination; 18 of them for the diploma and membership of the Royal College of Obstetricians and Gynæcologists and for the final FRCS examination and the diploma in anæsthetics. Service at Queen Mary's
shalton, and at St. James
, Royal Colleges of Physicians
qualification for the diploma in child health.

MENTAL HOSPITALS BRANCH

The mental health services of the LCC are responsible for a large medical service, vacancies in which are normally advertised at short intervals. No new permanent appointments are being made at present; indeed the staffs of the various hospitals have been reduced as a war measure. In peace-time those appointed to the service may be sent to any of the Council's mental hospitals and may be transferred from one hospital to another should circumstances require it. An applicant enters the service as assistant medical officer at a salary of £470 a year, rising by annual increments of £25 to £570. Salaries are graded through the various ranks to £1450 paid to superintendents of large hospitals; a superintendent is also provided with an unfurnished house on the hospital premises. Assistant medical officers may be required to live in the institution which they are serving and to pay fixed rates for board, lodging and washing. Officers contribute to a superannuation fund. They are required to take a diploma in psychological medicine within three years of entering the service and the diploma carries with it a payment, in addition to salary, of £50 a year. Promotion is reasonably rapid for men. The mental health services are actively concerned in the EMS. Three hospitals are used entirely as emergency hospitals and at eight others there is an emergency hospital section. Treatment is provided for all types of acute, medical and surgical cases and the hospitals are staffed and equipped to give specialised treatment. The medical staff for these hospitals is drawn mainly from the emergency medical service.

MENTAL HOSPITALS OUTSIDE THE LONDON AREA

Posts for medical officers in the provinces are similar in scope and remuneration to those in London. They are advertised regularly in the medical journals.

THE MINES MEDICAL SERVICE

The new Mines Medical Service deals with about 2000 mines and nearly three-quarters of a million workmen. For many years there was only one medical inspector of mines; it has long been evident that one man could not be expected to cope with the varied problems peculiar to the industry. The service owes its origin to the white-paper on coal, issued in 1942. This laid down that there should be such a service, which now consists of eight regional mines medical officers, with a chief mines medical officer and deputy at headquarters. Of these, all but two regional medical officers have been appointed and taken up their posts. A long acquaintance with miners is essential and medical officers have to be prepared to spend a good deal of time underground. The duties fall into two main groups, with the added war-time task of helping the Ministry of Labour and National Service to deal with applications to leave the industry on medical grounds.

The two groups are: work at the mine; and work away from the mine. Work at the mine includes first-aid organisation. Since accidents are common and severe, and since a doctor is seldom present at the time, it is essential to maintain a high yet simple standard of first-aid among the miners, a good ambulance service and adequate equipment. Another aspect of the work is investigation of causes of mining industrial diseases and of conditions which may aggravate diseases not of occupational origin, the aim being to introduce and perfect preventive measures. The occupational diseases include inflammatory conditions of the knee, hand, elbow and wrist, the complex disability known as miners' nystagmus, pulmonary
neumo-
coniosis), spirochætal
Such
varying factors must
of coal
seam at which the men
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questions of heat, humidity and water. Examination of the victims after an accident injuring or killing many men, such as an explosion, may throw light on the

special centres for miners. Knowing underground occupations thoroughly, the MO can advise on the most suitable work in or about the mine for men leaving the rehabilitation centre who are not up to their former job, or who need a spell of light work. He must also keep in close touch with general practitioners, hospital medical officers, doctors in charge of special clinics for miners, and doctors retained by the colliery companies to advise them on medical matters connected with their mines.

It is hoped that the service, through these activities and others yet to be developed, will contribute increasingly towards better health in miners, and to the early and advanced treatment of accidents.

PRISONS

-time officers are appointed,
ical officers to assist them.
vided or an allowance made in aid of rent. Posts are pensionable and promotions are made as vacancies occur. Candidates with a diploma in psychological medicine receive £50 per annum more on appointment than candidates without this qualification, and are given preference provided they also have good all-round general experience. At the smaller prisons no whole-time officers are employed; local practitioners are usually appointed as part-time officers. Further particulars can be obtained from the Prison Commissioners, Kensington Mansions, Trebovir Road, London, S.W.5.

Services Abroad

INDIAN MEDICAL SERVICE

Recruitment to the Indian Medical Service, which is designed primarily to meet the needs of the Indian Army, has been modified by the war, and officers are now appointed to emergency commissions in the military
the war. The method of
officers, other than those of
, has been altered and those
wishing to be appointed are
Army Medical Corps first.
they can apply to be posted
and are then given an opportunity to transfer to the Indian Medical Service. Officers selected for transfer will be given preference if permanent commissions in the Indian Medical Service are granted again after the war. The upper age-limit for European emergency commissioned officers on appointment is at present 45. Officers on appointment to the IMS are eligible for the grant of antedates, which are reckoned in assessing service for seniority and promotion, in respect of specified higher medical qualifications (six months or one year),
appi
ximum
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ed to a
total
to half
the period spent in practice, less the period granted in respect of hospital appointments, is also allowed up to a maximum of 5 years. All previous full-pay commissioned service with the Armed Forces as a medical officer also counts towards rank and seniority on transfer.

Qualified officers selected for specialist posts are granted appropriate temporary rank with the pay and allowances of the appointment. Passages to India are not granted to wives and families but if, on the termination of his service, an emergency commissioned officer chooses to stay in India, an allowance can be made to take him and his family to the place they choose to live in.

The pay of a European lieutenant in India is £585 per annum and of a captain on promotion £750 per annum; on his release an emergency commissioned officer receives a minimum gratuity of Rs.2000 if his date of registration as a doctor was before Jan. 1, 1940, or Rs.1000 if registered on or after that date, provided he completes a year of service; he gets an addition of a month's pay for each further year of Army service. If invalided out for a disability due to service he receives disability retired pay appropriate to his rank and degree of disablement, which for Europeans is as for officers of the RAMC. If he dies as a result of military service during the war, provision is made for his widow and children.

Women medical officers are appointed direct to the Indian Medical Service by the Secretary of State for India under conditions similar to the above. So far 32 have been appointed from the United Kingdom. Full information regarding these appointments and those available for Indian medical officers, for whom the age-limit is 40, may be obtained from the Secretary, Military Department, India Office, 4, Central Buildings, London, S.W.1.

Immediate formation of an Indian Army Medical Corps has lately been sanctioned. The new corps will be organised on similar lines to the RAMC, and will receive by transfer the whole existing personnel of the Indian Medical Department and the Indian Hospital Corps. All regular commissioned officers of the IMS in military employ, as well as emergency commissioned officers of that Service, are to be seconded to the IAMC, but such officers will retain their IMS privileges.

WOMEN'S MEDICAL SERVICE FOR INDIA

Admission to the service is by selection in India and England. The cadre consists of 44 permanent and 6–10 temporary medical officers. Appointment is open to English and Indian qualified women. Vacancies are few—usually only 3 or 4 in each year, and there is little recruitment from England. There is also a training reserve of about 14 recently qualified women recruited from Indian universities. Since the outbreak of war no members of the training reserve have been sent to England for postgraduate study. Leave out of India has also been restricted and vacancies in the service are being filled by doctors in India as need arises. The office of the Dufferin Association in London is closed for the duration of the war, and the post of medical adviser is in abeyance. Those seeking information about the Association should apply to the High Commissioner for India, India House, Aldwych, London, W.C.2.

During the war women medical officers are appointed direct to emergency commissions in the Indian Medical Service by the Secretary of State for India, under conditions similar to those for men, as noted above.

COLONIAL MEDICAL SERVICE

The Colonial Office is anxious that young doctors should realise that recruitment for the Colonial Medical Service at the present time has been officially approved and that service in the Colonial Empire is of as much national importance as service in the Forces. Vacancies occur most often in the larger medical departments in tropical Africa. Specialist appointments are usually reserved for officers who have shown outstanding merit in a particular branch of medical practice. Vacancies may arise for women with experience in maternity and child welfare work. Selected candidates are generally required to attend a course in tropical medicine and hygiene, before going overseas or during their first leave period. The various government medical departments employ about 700 European medical officers, including some 30 women, and about 1200 locally appointed medical officers. Medical experience may include—among other diseases associated with the [illegible] yaws, leprosy, sleeping sickness, [illegible] yellow fever and cholera, as well as the diseases of common medical practice. An officer in the Colonial Medical Service has special opportunities for the practice of his profession in preventive medicine as well as in other branches; there are also opportunities for teaching and research. Full particulars of the terms and conditions of service may be obtained from the Director of Recruitment (Colonial Service), Colonial Office, 2, Park Street, London, W.1.

SOUTHERN RHODESIAN MEDICAL SERVICE

The government of Southern Rhodesia maintains a medical and public health service in which there are 16 whole-time appointments and 34 part-time appointments. The part-time government medical officers are usually in general practice and serve all stations except the large towns of Salisbury and Bulawayo. There are also 9 medical officers who receive a subsidy of £250–£360 a year for doing necessary government work; most of these are medical officers to mines or medical missionaries. Rates of pay for whole-time officers are as follows:

Medical director, chief health officer, and director of medical services	£1500 p.a.
rising by £50 increments to	£1750 p.a.
Director of laboratories (2 posts)	£1000 p.a. rising by £50 increments to £1250 p.a.
Radiologist (2 posts)	
Medical superintendent of mental hospital	
Field officer	
Health officer	
Male school medical officer	
Female school medical officer	£600 p.a.
rising by £25 increments to	£900 p.a.
Medical officers to leprosy or mental hospitals (3 posts)	£600 p.a.
rising by £25 increments to	£750 p.a.

Government part-time medical officers are appointed at a salary of £600 p.a. rising by £25 increments to £750 p.a. Promotions are made as vacancies occur to posts which carry a final salary of £900 p.a. Officers usually find that practice offers an additional source of income ranging from £200 p.a. upwards. Their government duties include the supervision of the 18 government hospitals and numerous native clinics, and of gaols, police camps and government stations. Leave is granted at the rate of one-eighth of service, and may be taken in periods not exceeding 184 days at a time; study leave is also granted. After two years' service medical officers under 45 can be appointed to the fixed establishment and contribute to a pension scheme, the retiring age being 60. The service has released many officers to serve in the Forces, and additional calls have been made on the remaining medical personnel since the department took over the hospital care of a large air training group in the colony, as well as the supervision of the several camps of interned Italian civilians. Appointments in Great Britain to the Services are made by the High Commissioner for Southern Rhodesia, Rhodesia House, 429, Strand, London, W.C.2, who will supply details on request.

SUDAN MEDICAL SERVICE

This service is responsible for carrying out civil medical and public health duties in the Anglo-Egyptian Sudan and for the health of the Sudan Defence Force. The British staff consists, at present, of 34 medical inspectors and senior medical inspectors with 11 additional senior posts, promotion to which is by selection. Medical inspectors are first appointed on probation for two years. Pay starts at £E720 (approximately £738), rises by biennial increases to £E1080 and after 13 years service to £E1200 (approximately £1230). There are higher scales of pay for the senior posts. No income-tax is at present levied in the Sudan. There is a pension and provident fund. An official qualifies for pension at the age of 48 if he has then completed at least fifteen years service and retirement is usually enforced at 50. [illegible] is provision in the pension scheme for widows and children. The service offers experience among many different races, including medical and surgical work in large and well-equipped central hospitals, supervision of medical and public health work in the towns and districts, inspection of schools and school-children, examination of candidates for government service and the training of Sudanese doctors, sanitary officers and overseers. The Khartoum Medical School is staffed by members of the service who receive additional remuneration for this work. Private practice is allowed so long as it does not interfere with government duties but there are opportunities for such practice only in a few of the larger towns. In peace-time, leave of 90 days is usually granted every year after the first 18 months of service, and study leave may be given for special purposes. During war-time there is only local leave in Africa and to the Near [illegible] bilities. [illegible] porary co[illegible] duties ha[illegible] Recruitm[illegible] since been [illegible] is fully aware of the requirements of the service and has raised no objection to the appointment of those selected to fill vacancies. Further information and particulars as to vacancies may be obtained from the Consulting Physician to the Sudan Government, 93, Harley Street, London, W.1.

Postgraduate Study

THE request of the Minister of Health that universities and medical schools should suspend whole-time postgraduate courses as far as possible has been so widely supported that special courses in the United Kingdom are now extremely rare, though opportunities survive in Eire.

The undergraduate medical schools still provide opportunities of work for higher examinations for their own graduates. Most schools and hospitals which take postgraduate students in peace-time fall into one of three groups:

(A) Those hospitals which are carrying on much the same teaching facilities as before the war.

(B) Those hospitals which, as a result of bomb damage or the need for reserving beds for the EMS, have little or no facilities for inpatient teaching, but which continue to teach in outpatient departments, and still offer resident appointments; in some of these selected students can be taken on as clinical assistants and in most of them hospital practice is available by arrangement with the dean.

(C) Those hospitals which have had to suspend postgraduate teaching altogether, but which still appoint resident officers and in some cases clinical assistants.

The refresher courses for insurance practitioners organised by the Ministry of Health before the war are still suspended, but equivalent instruction is still provided in London by a programme selected from the activities of the various departments of the British Postgraduate Medical School, and to a large extent by practice at the Prince of Wales's, Hampstead General, and Metropolitan Hospitals.

General Hospitals

At the British Postgraduate Medical School (group A), although the number of beds is reduced and the full-time staff depleted by the Services, teaching is continuing on prewar lines, though students wishing to attend for more than one month have to obtain special permission. The ordinary programmes are being carried on, in medicine, surgery, obstetrics and gynæcology, and pathology, and the principle is maintained of continuous teaching by the ordinary British methods of bedside tuition and lectures rather than by specific courses. The teaching is of a high standard, suitable both for those who merely wish to improve their knowledge and for candidates for higher examinations. Special courses on war medicine, fractures, war surgery of the chest, the nervous system, the extremities, abdomen, &c. are held in rotation on alternate weeks. These intensive courses last a week, to suit the needs of officers in the Services. They are advertised in advance in the medical papers. Fees are 1 guinea a week for ordinary students and for special courses, except for the fracture course for which the fee is 5 guineas. A limited number of students can be given a fortnight's special tuition in anæsthetics, the fee being 3 guineas.

The Prince of Wales's, Hampstead General and Metropolitan Hospitals fall into group B, and the Royal Northern, the National Temperance and Queen Mary's Hospital, Stratford, into Group C.

Special Courses

PUBLIC HEALTH.—All university courses for diplomas in public health are at present suspended except those at the three colleges of the University of Ireland, at Dublin, Cork and Galway. A course will be held at the Royal Institute of Public Health and Hygiene during the coming session for any candidates who are eligible for enrolment under war-time requirements.

PSYCHOLOGICAL MEDICINE.—The course for the DPM will be held at the Maudsley Hospital as usual in the early months of next year.

In January and February lectures and practical [illegible] nd physiology of [illegible] covering part I [illegible] o May inclusive [illegible] cover all aspects of psychiatry and mental deficiency, and clinical instruction in psychiatry and neurology complying with the requirements of the examining bodies is arranged. Lectures [illegible] pathology [illegible] still distr[illegible] ency Hos[illegible] is given at [illegible] Council mental hospitals and institutions for mental [illegible] psychological testing, appraisal of psychometric data, prognosis in traumatic and other neuroses, and short methods of [illegible] Hospital, Epsom, Surrey.

The educational work of the Tavistock Clinic, though necessarily limited by lack of staff, has been continued. It has been found possible to reopen the training course for educational psychologists; three students were trained during the past year, and four will be taking the course in mental teaching and remedial treatment in the coming session. A two-weeks' course in mental testing was given to doctors last July, and the lectures on mental health in childhood are being continued for students taking the academic diploma in psychology of London University. Owing to the absence of many doctors on active service, the overwork of general practitioners and the shortage of staff at the clinic, the main lecture courses are still in abeyance. Next session, however, there will be weekly courses for doctors in training, including two child psychiatrists with fellowships from the Child Guidance Council. Monthly discussions will also be held to which all child psychiatrists working at clinics in the London area are invited. A programme of educational work has been planned to take effect as soon as the war ends.

The London School of Hygiene and Tropical Medicine is as usual holding a course for the academic diploma in psychology.

TROPICAL MEDICINE.—A diploma in tropical medicine is required b[illegible] the tropics. [illegible] Liverpool an[illegible] Conjoint Board. Courses normally held at the London School of Hygiene and Tropical Medicine and the Liverpool School of Tropical Medicine have now been suspended until the end of the war and no regular courses have been held recently for the Edinburgh diploma; future courses at Edinburgh will depend on the demand and on the staff available. Examinations for the Conjoint diploma have been cancelled for the duration of the war.

Intensive courses in tropical medicine and parasitology, each lasting a fortnight, have been provided at both the Liverpool and London Schools,[1] however; these are designed mainly for medical officers of our own and allied Services, though civilians may also attend them by special arrangement. About forty candidates can be accepted at a time, and new courses begin every three weeks.

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[1] [illegible] Secretary, Liver[illegible] Place, and from [illegible] Tropical Medicine.

NEUROLOGY.—At the National Hospital, Queen Square (B), hospital practice is available to selected clinical clerks (5 guineas for three months, 7 guineas for six months), and outpatient clinics are held each morning at 11 AM, on Monday to Friday (1 guinea for one month, 2 guineas for three months). The West End Hospital (B) holds special classes—consisting of demonstrations of cases with commentaries—for a month four times a year, before each MRCP examination. Up to six students are welcome at the Tuesday morning ward rounds (no fee). The Maida Vale Hospital (B) provides hospital practice, and may be continuing DPM teaching if it is needed.

HEART AND LUNGS.—At the Brompton Hospital (B) limited hospital practice is available, and courses are held in preparation for the MRCP and Conjoint examinations. The Royal Chest Hospital (B) provides outpatient practice and special courses on heart diseases in conjunction with the Fellowship of Medicine. The London Chest Hospital, Victoria Park (B) has been re-established, after the damage it sustained, and provides facilities for hospital practice in all chest diseases including tuberculosis. It has a country branch at Camberley, Surrey.

CHILDREN.—The Hospital for Sick Children, Great Ormond Street (B) is providing limited postgraduate instruction; special consideration will be given to candidates for the diploma of child health. The Queen's (C) and Princess Elizabeth of York (C) Hospitals have suspended postgraduate teaching. Diplomas in child health are granted by the English and Irish Conjoint Boards and by University College (NUI), Dublin, where a course is now being arranged.

MATERNITY.—Queen Charlotte's (A) is still offering facilities at Hammersmith, subject to war-time conditions. The City of London Hospital (C) has been damaged and teaching is still suspended. Hospital practice in the maternity department of the British Postgraduate Medical School is available.

CANCER AND RADIOLOGY.—At the Royal Cancer Hospital (A) teaching continues as before the war. Special courses are held for the final FRCS both in surgery and in operative surgery, and postgraduate courses are held qualifying for the diplomas in medical radiology of London University and of the Conjoint Board. The Mount Vernon Hospital (B) offers hospital practice in its hospital at Northwood; 50 beds are reserved for cancer cases and this number is likely to be increased. Additional cancer cases are received under the EMS scheme.

OPHTHALMOLOGY.—The Royal London Ophthalmic Hospital (A) is carrying on as usual at Moorfields. The Central London (B) continues as usual, except that no special courses are being held. The Oxford University course for the DO is being continued.

EAR, NOSE AND THROAT.—At the Royal National Hospital (B) hospital practice is available but no special courses are held. The Metropolitan Hospital (A) is continuing its teaching and classes on outpatients in London and Watford, but all inpatients are transferred to the EMS base hospital. Golden Square Hospital (B) provides hospital practice.

ORTHOPÆDICS.—The Royal National Orthopædic Hospital (B) has suspended teaching, but the outpatient department is open to postgraduates.

GENITO-URINARY AND RECTAL DISEASES.—The London Lock Hospital (A) continues to provide instruction for postgraduates who wish to obtain the 130 hours' instruction required by the Ministry of Health for a special certificate, and teaching facilities generally continue unaltered. Hospital practice is available in the outpatient department of All Saints (B) and St. Paul's (B). At St. Peter's Hospital (B) practice is available in the outpatient department. Special courses are held at Colindale on behalf of the Fellowship of Medicine, which makes arrangements if there are a sufficient number of applicants.

[illegible]—Limited hospital practice is available in the [illegible]tient department at the London School of Dermatology (B) and there is [illegible] session in outpatients at the British Postgraduate Medical School on Thursdays at 2 PM.

TUBERCULOUS DISEASE.—The course and examination for the diploma in tuberculous diseases normally granted by the University of Wales are suspended, and no other diplomas are available in this subject.

BACTERIOLOGY AND CLINICAL PATHOLOGY.—The courses for the diplomas in bacteriology of London and Manchester Universities have been suspended. The University of London diploma in [illegible] is not officially suspended but so far [illegible] ve offered for the next session.

ANÆSTHETICS.—Practical courses of instruction in anæsthesia, lasting a fortnight, are provided at the British Postgraduate Medical School (fee 3 gns.) Arrangements can be made through the Fellowship of Medicine for instruction in the department of anæsthetics at Oxford; apart from this routine teaching the department also offers fortnightly revision courses twice a year, at which graduates are given three lectures daily and attend the routine anæsthetics in the Radcliffe Infirmary.

INDUSTRIAL HEALTH.—Weekend courses in industrial medicine and hygiene are provided periodically by the London School of Hygiene and Tropical Medicine and by the Universities of Birmingham, Leeds, Manchester, Sheffield and Bristol.

Special Articles

WOMEN MEDICAL STUDENTS IN LONDON

A REVIEW OF THEIR POSITION

THERE are at the present time about 12,500 medical students in the British Isles of whom about a fifth are women. The highest percentage of women students is in the Welsh National School and the lowest (12% only) in London, where there are in round figures 600 women out of a total of 5000 students.

The difficulty facing women who wish to enter medical schools in London is obvious but accurate details of the number of candidates rejected are not readily available. It has been roughly estimated, however, that only about 25% of the women applying for entry to the London medical schools are accepted. These do their preclinical studies either at University or King's Colleges or at the London School of Medicine for Women. The LSMW absorbs about 100 a year, University College take 20 more or less and King's College 8. The clinical work is done at the Royal Free Hospital by students of the LSMW and at the corresponding hospitals for University and King's students. About 12 of the University College students proceed each year to the West London Hospital, which gives preference to women; and under a purely war-time arrangement King's College accepts an additional quota of 8 women students who intend to do their clinical course at the West London. Most of the women training for medicine in London are reading for London University degrees; the only exceptions are a relatively small number of Oxford and Cambridge students who come to London for clinical work only—15 or 16 distributed among the four clinical schools which accept women.

Unlike the other twelve medical schools, the West London is not a part of London University. Its admission is under consideration but is likely to await the report on the whole question of the position of women medical students and the assurance of inspectors that the requirements of the university are being met. No external school can claim a share in the Treasury grant and meanwhile the West London must depend on its own financial resources. Nevertheless it is now the second largest school for women in London, although its students, the majority of whom start as internal students at University and King's, have to complete the MB, BS degrees externally.

The fate of these women rejected by the London schools after taking the 1st MB is not known with certainty, but it seems that well over 100 of them gain admission each year to provincial schools. The loss to London is the greater because selection has presumably raised their standard above that of the male applicants. But unless more places are made available London cannot absorb them without excluding an equal number of men. Even so the substitution, each year for five years, of 100 women for men in London schools would only bring the percentage of women up to 22, which is about the average for the British Isles.

It is often argued that the time and energy spent on the medical education of women is largely wasted because a substantial proportion give up their careers on marriage or for other domestic reasons which do not occur in the case of men The argument could of course be used as a reason for not training a woman for any profession, and it assumes that a married woman gives up practice entirely and not merely during the years when her children are young In fact it appears that some 30% of women on the Medical Register under the age of 50 are not in active practice, but even in the case of men there is some wastage It is known that 8% of the men on the Register under 40 have not pursued their professional work.

These, then, are the facts of the situation No-one can estimate the future need of the community for women practitioners although it would probably be agreed that the profession will be able to absorb a larger number of women in the future than it has done in the past A
admission of women to London
to bring the percentage of
the level for the British Isle
ne, seem to deserve serious
that there are several lines of approach to the problem In the first place it would be possible for all schools to admit women, but this has objections. It seems probable that most of the London schools would only submit under compulsion—and women students studying in coerced schools would be at a disadvantage. An alternative would be for some of the existing schools which now accept men only to agree to take women as well; but the experience during and after the last war suggests that such a proposal would meet with considerable opposition, and it is doubtful if any of the schools would readily agree to adopt such a policy. The only alternatives appear to be the provision of new schools or the extension of existing schools that admit women

Before such a step is taken the advantages and disadvantages of co education in medicine must be carefully considered There can be little doubt that in London men medical students prefer schools for men only, while the women prefer co education The reasons are complex, though the fact must be faced. There is, however, no evidence of this prejudice in the memorandum on medical education drawn up by the British Medical Students Association, where it is specifically recommended "that the principle of equal opportunity for men and women in the profession be accepted and that all medical schools be open to men and women on an equal basis"

In planning the future, the establishment of mixed medical schools can only be successful provided that the

facilities and social amenities might be successful. The only other possibility would be to enlarge or increase medical schools for women only, and this would not be a popular move with the women students though it would certainly be better than nothing.

The courageous thing would be the creation of (say) two new medical schools where men and women are received on an equal basis

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UNIVERSITY OF GLASGOW —During September the following lectures will be held in the eye department of the Western Infirmary, Glasgow, on Wednesdays at 8 PM Dr J. B Gaylor, the fifth nerve and the cornea (Sept 8), Prof Loewenstein,

medical practitioners and senior students

BRITISH MEDICAL STUDENTS ASSOCIATION

UNDER the presidency of Prof J A Ryle the BMSA
has now been
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hospitals in the British Isles have now joined with the
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Malta, GC, who have
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The most outstanding event during the year was the congress held last December the first of its kind, judging by the attendance and enthusiasm, it will not be the last About 500 students were present from medical schools all over the country Among the principal speakers were the Minister of Health, Dr Charles Hill, Lord Moran and Professor Ryle The future policy of the association was outlined and members were reminded of the part they must play in the success of the organisation.

The association's *Memo on Medical Education* (see below) was finally prepared and published in time for the congress and submitted by the secretary to the meeting. It was based on evidence submitted by some 16 schools. Among the more important recommendations were the following

1 That medical students should be drawn from all sections of the community without reference to their financial means or sex

2 That they should have the opportunity of working within a university and not in isolated medical schools This would prevent too early dissociation from students of other faculties

3 That newly qualified doctors should be compelled to fulfil a period of house appointments before a licence to practise was granted

Evidence has already been submitted to the Interdepartmental Committee
BMSA hopes to meet the
The association has tri
students about the future medical service It was decided at the congress to elect a subcommittee to study the implications of assumption B of the Beveridge plan. Present day students, it is felt, should have a clear understanding of the movements now being made towards
service. The sub-
committ
time for the annual
general
the association has
dent health Many
British universities
tory All students,
tend to live in sur-
The memorandum
hostels and approved
"digs" as a first step Routine X ray examinations are also strongly recommended Since this is a problem that concerns all students the BMSA is cooperating closely with representatives of the NUS, SNUS and British Dental Students Association

Throughout this first year emphasis has been laid on recruitment of members and on long term policy in regard to student health and medical education, but

and also the Colonial Office and the Crown agencies for their help in securing transport for the books There are now well over 700 books packed ready for dispatch. Staff student committees have been started in many hospitals and seem to be working well The offices of the association are already rapidly developing into a general inquiry bureau, and we hope that after the war we will be able to set aside a special department to give assistance and advice on problems affecting those in training. A course of holiday lectures has been arranged in London for any students who can attend There will be 8 lectures in all, covering many aspects of war surgery. Owing to the Paper Control Act it has not been possible to publish a regular news bulletin.

The association has made many good friends during its first year and with their help and the support of about 90% of the medical students it hopes to go forward to greater things in the coming year.

STUDENTS ON THE BEVERIDGE PLAN

DURING the last year meetings have been held in nearly every medical school in the country to discuss the Beveridge plan and the future of the medical services. The Beveridge subcommittee of the British Medical Students Association collated the opinions of these meetings and reported to the annual general meeting of the association on July 23 and 24.

All schools had given support to the aim of the plan as a whole, and to the conception of the national minimum, though there was disagreement on the size of children's allowances. Student opinion however had been concentrated on assumption B, and in regard to this there was wide disagreement between schools. Realising this, the committee had attempted to formulate a generalised report for discussion.

If we supported the plan as whole, they suggested, we must be prepared to become part of a comprehensive service; but practitioners should be free to remain outside it. Those covered by the scheme should be assured of opportunity for postgraduate work, and diagnostic facilities and specialist advice should be easily available. No agreement could be reached on the question of payment. The subcommittee suggested a combination of fixed salary and capitation fees, with an upper limit to the number of patients under any one practitioner. Practice would be carried out at health centres where several doctors would share facilities. These centres would be linked with regional hospitals, and their work would include rehabilitation, health education and propaganda. The organisation would unite both personal and environmental services. Regional administration would be by a regional body, having both lay and professional members. The subcommittee's report ended with a review of progress so far, and noted that though the Government had given full support to assumption B it had rejected the principle of a national minimum, without which the scheme ceased to exist.

Mr. David Pyke, speaking for the executive committee, remarked that though more than three-quarters of our contemporaries would become general practitioners, less than a quarter wished to do so—a significant criticism of the present situation. He thought that doctors working at health centres should be salaried, and did not believe the obstructive type of local control seen in the past need vitiate the scheme, or that the present personal relationship between doctor and patient need be lost at a health centre.

A student from Sheffield had been impressed, on a visit to an LCC hospital, by the fact that the patient-doctor relationship had not been marred by economic considerations. A lively discussion ranged over National Health Insurance, the cost of the Beveridge plan and the cost of not applying it, maternity grants, the dangers of political control, and the state services in New Zealand, Denmark, Russia and Chile.

A resolution urging the Government to affirm and implement the Beveridge principles without delay was carried by 34 votes to 3, with 2 abstentions. Meanwhile they should get on with the comprehensive health service, based on health centres with free choice of doctor.

A STATE EXAMINATION

THE British Medical Students Association, in their *Memorandum on Medical Education*,[1] favour a uniformly high standard in medical qualifications, and set out a plan for achieving it. They suggest that clinical instruction should last 33 months (3 academic years), and that at the end of this time the student would be eligible to sit for his university qualification of MB, BS. Universities and hospital medical schools would be registered under a state examining board which would ensure that their degrees conformed to an agreed standard. Above this standard the universities and hospitals would have a free choice: some might offer special instruction in a certain branch of medicine, or run an honours course in medicine or surgery. Students would thus be able to choose their schools with a special end in view. Having taken his university degree the student would go on to a period of interneship, to last at least a year. He would be paid during this time, but he would not be qualified to practise outside his post. The interneships would include not only medical and surgical house appointments, but a choice of apprenticeship to a general practitioner, or a medical officer of health, or an ear, nose and throat appointment. The posts could be varied according to the choice and ability of the student. At the end of the year the student would be eligible to sit the state qualifying examination. There are 23 qualifying bodies at present, in Great Britain and Eire, each with its own standard, and the range in standards is considerable. The proposed state examination would set out to provide a "basic doctor" suited to the needs of his time, and it would be taken by candidates who had had 45 months of clinical experience. The students suggest that this state examination should be conducted at the expense of the state.

FOR STUDIOUS PRISONERS OF WAR

THE Prisoners of War Department of the Red Cross and St. John War Organisation has an educational books section which furnishes books and study courses and arranges examinations for men and women in prison camps. To the philosopher, life in a prison with its monotony, its narrowed range of interests, and its enforced order, must offer a matchless chance to do that solid reading which the free find so easy to postpone. And it seems that many prisoners achieve that degree of philosophy, for by May of this year the educational books section had had over 24,000 requests for books and study courses; some 150,000 books and well over 6000 courses had been sent, by then, and requests have grown considerably since. The section is in touch with the International Red Cross Committee at Geneva and with the other bodies represented on its consultative committee.

Some camps have been able to establish teaching on an ambitious scale. One has a university with six faculties; at another, a headmaster in civil life has formed a school with a staff of 41 qualified tutors; 2400 students attend classes daily while an additional 15,000–17,000 who are out on working parties receive help from the school.

Thanks to the coöperation of many colleges and institutions who have supplied study courses, men have been enabled to train even for professional examinations including those in medicine and the law. The demand for examinations has been striking; at the beginning of 1942 only 3 or 4 camps were asking for them, but by the end of the year requests had come in from 27. Seventy bodies are holding examinations for them, and nearly all have waived examination fees. The standard of marking in these examinations is not lowered for prisoners of war, and of the 367 results so far published 296 were successful and there have been several prize-winners. On the whole German camp authorities have proved coöperative and helpful, but the Italian authorities have not yet agreed to further the plan. It is pleasant to know that German prisoners in Canada are also being given an opportunity to take examinations. Voluntary contributions cover 90% of the cost of this work, in which books are the most expensive item. At present the section is spending over £1300 a month on them, and would welcome spare copies of the following medical books:

K. F. Armstrong: Aids to Anatomy and Physiology for Nurses.
A. M. Ashdown: Complete System of Nursing.
    Complete System of Nursing for Male Nurses.
    Elementary Practice of Nursing.
A. O. Bentley and J. E. Driver: Textbook of [illegible]
    Chemistry.
L. A. Borradaile: Elementary Zoology for Medical Students.
E. N. Chamberlain: Symptoms and Signs in Clinical Medicine.
B. M. G. Copestake: Theory and Practice of Massage and
    Medical Gymnastics.
E. M. Greisheimer: Anatomy and Physiology.
D. C. Kimber, C. E. Gray and C. E. Stackpole: Textbook of
    Anatomy and Physiology.
K. D. Knipers: Essentials of Chiropody for Students.
E. L. Macaulay: Textbook for Mental Nurses.
E. C. Pearce: Anatomy and Physiology for Nurses.
    Textbook of Orthopædic Nursing.
F. W. Price: Textbook of the Practice of Medicine.

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[1] [illegible] price 1s., may be obtained from the Secretary, BMSA, BMA House, Tavistock Square, London, WC1.

Rose and Carless: Manual of Surgery.
E. G. V. Bunting: Practical Chiropody.
W. G. Sears: [illegible]
A. L. Turner: [illegible]
R. Watson-Jon[illegible]

Volumes should be sent to Educational Books, Prisoners of War Department, British Red Cross Society, New Bodleian, Oxford.

Apart from those who wish to work seriously at a subject there are prisoners of less studious disposition, as well as many who are wounded and sick. It is the immemorial custom of prisoners to fill in their time with handicrafts; the first chapter of *St. Ives* gives an unforgettable picture of our Napoleonic prisoners in Edinburgh Cast[illegible] visitors. Even this [illegible] tic value, as Miss A. [illegible] Woodside Hospital, Muswell Hill, reminded us in the *Times* of July 31. She is sending parcels containing necessary materials and directions to prisoners; and she asks for the views of those interested and experienced in this type of work. Material and tools are probably even more important than a set scheme. An occupational therapy staff, elected by [illegible] sible for working out [illegible] and keeping touch with [illegible]. Parcels should be directed either to the senior British officer or to the officer in charge of occupational therapy at the prison camp.

AFTER FOUR YEARS OF WAR

(From THE LANCET of Aug. 31, 1918)

"A [illegible] auspices of the Abernethian [illegible] Hospital, London, was devoted [illegible] 'That . . . the study of surgery at the present time is of greater importance than the study of medicine.' Major L. Bathe Rawling, RAMC, who [illegible]

[illegible] tion by consulting the stethoscope. Sir Thomas Horder and Dr. A. E. Stansfeld opposed the motion, the former on the ground that the fitness or otherwise of the recruit for military service was a matter almost solely in the hands of the physician, and that even in the actual field of war the surgeon's scope was limited, in that the vitally important first-aid work was best carried out by well trained orderlies. . . . Dr. Stansfeld expressed the opinion that surgery could be more easily 'picked up' than medicine. . . . The motion was lost by a two-thirds majority."

„The verdict suggests that while medicine in its broadest sense is a scientific whole, internal medicine . . . is to be regarded as the mother of all other clinical divisions. This conclusion has been repeatedly forced upon medical teachers on both sides of the Atlantic."

Infectious Disease in England and Wales

WEEK ENDED AUG. 14

Notifications.—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 1558; whooping-cough, 1855; diphtheria, 491; paratyphoid, 6; typhoid, 10; measles (excluding rubella), 1476; pneumonia (primary or influenzal), 316; puerperal pyrexia, 118; cerebrospinal fever, 46; poliomyelitis, 11; polio-encephalitis, 0; encephalitis lethargica, 2; dysentery, 119; ophthalmia neonatorum, 108. No case of cholera, plague or typhus fever was notified during the week.

[illegible]

Deaths.—I[illegible] from enteric [illegible] 13 (1) from [illegible] 30 (5) from d[illegible] 7 (0) from i[illegible] those for London itself.

Birmingham reported 4 deaths from whooping cough.

The number of stillbirths notified during the week was 184 (corresponding to a rate of 30 per thousand total births), including 20 in London.

Reviews of Books

Year Book of Neurology, Psychiatry, and Endocrinology 1942

Editors. HANS H. REESE, MD; NOLAN D. C. LEWIS, MD; ELMER L. SEVRINGHAUS, MD. (Year Book Publishers; Lewis Pp 768. 19*s*)

BEFORE the war a steady increase in bulk made it doubtful whether this Year Book could much longer continue to house its three inmates. External factors have lessened the problem of finding space for abstracts of articles in many languages, and have heightened its value. The informative section on neurology does not include papers dealing with war injuries of the central nervous system and their treatment, though Professor Reese advocates in his introduction a rational policy for rehabilitation after such damage. Electro-encephalography receives special attention, less perhaps than the output of articles on it would demand; and the work of Freeman and Watts on prefrontal lobotomy is reviewed in detail. The abstracts dealing with meningitis and encephalitis are particularly full. The section on pyschiatry has fewer of the critical editorial notes which so greatly enhance the value of the sections on endocrinology and neurology, and the abstracts are less concise. Psychometric [illegible] any notice. Seventeen paper[illegible] are summarised at length; [illegible] of emotional change and child psychiatry are also well covered. The section on endocrinology is as good as ever: the editor makes the trend of recent work and his own opinion plain in a series of pithy honest comments, guiding the reader through what could easily be a jungle of discrepant reports. Endocrinology moves fast, but sustained by Professor Sevringhaus's encouraging whispers in small print the reader of the Year Book can keep up with it.

Treves's Students Handbook of Surgical Operations

(7th ed.) C. P. G. WAKELEY, D SC LOND, FRCS. (Cassell. Pp. 562. 12*s*. 6*d*)

IN this edition of a valuable manual Mr. Wakeley has discarded obsolete procedures while describing in detail the various opera[illegible] examination exercises. [illegible] maintains its value. Alte[illegible] given. This is wise in the main, but surely the student should be expected to know something of abdominoperineal resection of the rectum; only the perineal operation is described. Modern methods of prostatectomy also deserve mention, more than do intramedullary tractotomy for trigeminal neuralgia and posterior cordotomy. The book is readable and gives many useful tips. The illustra[illegible] one or two do not agree w[illegible] Students will learn sound [illegible] even those sitting for higher surgical degrees will do well to read the chapters on operations likely to be required in the examination hall, often so loosely described. Mr. Wakeley has evidently profited by the examination mistakes he has seen others make.

Brompton Hospital Reports

Vol XI. (Gale & Polden. Pp. 136. 5*s*)

THE war has interrupted many cherished traditions but however little paper can be spared for reprinting articles we hope that these reports may still be allowed their quota. It is a great convenience to have within one cover three such important articles as those on pulmonary cavities: their persistence and closure (Price Thomas), paravertebral abscess with rupture into the pleura or lung (W. D. W. Brooks), and the anatomy of the bronchial tree (A. F. Foster-Carter). But probably the most important reprint is that of Miss L. C. Marx's follow-up work on pulmonary tuberculosis, which gives some idea of the endless trouble entailed in tracking down ex-patients, how successful it can be and how rich is the reward. Follow-up is the most important single component of clinical research and deserves to be more attentively studied. The volume closes with Clifford Hoyle on the care of the dying which shows that, be thoracic surgery what it may, the physician's art is not yet extinct.

Cabot's Physical Diagnosis

(13th ed.) Editor: F. DENNETTE ADAMS, MD. (Baillière. Pp. 888. 27*s.* 6*d.*)

IN earlier editions of this work Richard Cabot considered only those aspects of disease of which he had personal experience and techniques with which he himself was familiar. In the last and present edition, his successor, Dr. Adams, rightly feeling that no one person's experience is wide enough to include all that a student of physical diagnosis should know, has drawn freely upon the experience of his colleagues at the Massachusetts General Hospital and elsewhere; the result is thus a cross-section of the views of many rather than of one. The general method of approach to the subject is unchanged; regions of the body or various organs are cited in turn and the abnormalities that may arise in each whether as manifestations of local injury or general disease are shortly discussed. In that it encourages elasticity of mind the method has something to commend it; though, in the absence of clinical experience wide enough to give him a sense of proportion, the student may have difficulty in remembering that common things are common. This edition contains *much new and revised material, notably in the spheres* of cardiovascular disease, tuberculosis and neurology. It is illustrated amply and well.

A Textbook of Pathology

(4th ed.) WILLIAM BOYD, MD, LL D EDIN, FRCP. (Kimpton. Pp. 1008. 48*s.*)

THIS new edition has been condensed "through a tightening of the belt of speech" as the author puts it in his preface. The new additions include recent advances (such as the relation of vitamin K and heparin to thrombosis, and the Rh factor in erythroblastosis fœtalis) and rare disorders which previously were not included. Subjects omitted are covered in textbooks of bacteriology and immunology and elsewhere, so that their loss is not to be regretted. Indeed, the revision might have been even more thorough, for one or two contradictions have escaped Professor Boyd's eye—notably in regard to the source of small round cells, and the view to be taken of inflammatory reactions. It is not quite clear, moreover, whether he believes there is any fundamental difference between infiltration and degeneration; in fact the illustrations of fatty degeneration of liver show large droplets in the periphery of the lobules. Illustrations are abundant and technically excellent though it seems redundant to include engravings which virtually duplicate the coloured plates.

There is a useful guide to reading at the end of each chapter, and taken as a whole the book is a counsellor which the student is likely to value increasingly during his final years and after qualification.

Guide to First Aid Treatment of Home Guard Casualties

T. H. MEEK, MD DUBL. (Lewis. Pp. 55. 4*s.*)

THIS little book is arranged in the style of lecture notes, tabulated as much as possible, and is therefore in the growing class of first-aid booklets which should be used only as an adjunct to standard works. On the whole it is useful, but a few points are surprising. The contents of the Home Guard first-aid haversack described by Dr. Meek differ completely from those supplied; presumably he provided his own equipment though this is not made clear. Improvised methods for treating fractures without splints are given and in the main they are sound; an exception should, however, be made for patellar fractures which must always be splinted. The illustrations have been specially drawn and are clear and helpful.

Electrocardiogram and X-Ray Configuration of the Heart

(2nd ed.) A. M. MASTER, MD, FACP. (Kimpton. Pp. 404. 36*s.*)

Professor Master's earlier aim was to show how the form of the cardiogram is dependent upon the size and position of the heart. In this edition he covers a wider field. There is a new section on the heart in acute diseases, a group in which the cardiogram may alter without change in cardiac size or configuration, and there are striking illustrations of chambers and vessels made visible by intravenous injection of diodone—a method should enhance X-ray diagnosis.

Letters to the Editor

PURPURA OF THE SKIN

SIR,—Dr. Eli Davis has made a contribution to our knowledge of purpura by publishing his review of 500 personally observed cases, though many clinicians will disagree with his classification of these cases; that is inevitable in dealing with such a controversial subject. It is not my purpose to suggest an alternative classification, but to point out how much greater the contribution would have been if some indication had been given of what is a basic factor in all cases of purpura—the presence or absence of thrombocytopenia. If the series had been broadly analysed into cases associated either with a quantitative or qualitative platelet defect, or with normal platelets, and their respective bleeding times, clotting times and clot retractility times had been quoted, the article would have had much greater value.

If these data were given one could have greater faith in some of Dr. Davis's categories of purpura. If as an example the purpuras occurring at times of menstruation, pregnancy and the puerperium are examined (of which he includes 6 cases), it is found that they practically never result from these conditions per se, but except in the rarest instances are due to an associated factor such as thrombocytopenia caused by the action of quinine on the bone-marrow (Peshkin and Miller, *J. Amer. med. Ass.* 1934, **102**, 1737; Stone and Bunim, *Amer. J. Obstet. Gynec.* 1936, **31**, 1015), or to the similar action of antisyphilitic remedies (McCoogan, *Ibid*, 1935, **29**, 576), or to hyperthyroidism (Israel and Winsom, *Ibid*, 1941, **42**, 157), or to unsuspected scurvy (Mosher, *Surg. Gynec. Obstet.* 1923, **36**, 502), or to familial platelet disease (Sanford, Leslie and Crane, *Amer. J. Dis. Child.* 1936, **51**, 1114, and Davidson, *Ibid*, 1937, **54**, 1324). It is probable that a similar ætiology applies to some of the cases reported under the headings of alimentary, cardiovascular, rheumatic and hæmatological, so that many of these purpuras instead of resulting from different causes are essentially due to the same cause. I suggest that to present the 500 cases in this manner would be more convincing and valuable than to give a list of associated conditions in which the presence of purpura may be purely incidental and have no true pathological relationship.

West Middlesex County Hospital. C. W. F. BURNETT.

STABILITY OF VITAMIN C

SIR,—Regarding the statement on page 719 of the *Lancet* of June 5 that "Dr. Ellis knows of one case [of scurvy] due to scalding of the child's orange juice by the mother," boiling orange juice does not affect materially the vitamin-C content. Vitamin C is quite stable to heat in acid solution.

New York. HARRY BAKWIN.

TEACHING OF POSITIVE HEALTH

SIR,—In reference to Dr. Geoffrey Evans's letter of July 31, and remembering my own introduction to the wards ten years ago, I think that there is a definite need for instruction in positive health by clinical teachers. Coming straight from the analytical atmosphere of the laboratory and dissecting-room, the student is taken through a short preclinical course and faces his first patients with a very limited knowledge of the interaction of disease and life at its full functional value, which is positive health. I believe that as we enlarge our approach to disease the subject of positive health will take its place in general clinical medicine, just as preventive medicine and psychotherapy have done. The approach from the angle of positive health correlates the patient's physical, mental and spiritual condition with the part played by his environment; the patient is viewed both as an individual and as a member of society, to the benefit of both. It opens a new front in the attack on disease by allowing the clinician to strike behind the lines of physical and psychological prevention to the realm of the spiritual, eliminating those negative forces, emotional strain, self-indulgence and want, that breed disease. We can thus build up the positive forces that resist the attacks of disease, injury or circumstance—namely, peace of mind, purpose of life and means of refinement. The medical student, like a student at a

Notes and News

SUPPLIES AND DISTRIBUTION OF PENICILLIN

It is now generally known in the profession, and even to some extent among the laity, that penicillin has remarkable therapeutic properties, and frequent inquiries are made about its availability. The following statement of the present position is issued by the Medical Research Council.

In order to extend and amplify the pioneer work of Professor Fleming, and of Professor Florey and his colleagues at Oxford, the Medical Research Council, at the request of the Ministry of Supply, last March appointed a Committee on Clinical Trials of Penicillin, which controls the distribution of penicillin for purposes of clinical research, and is instructed to employ the present limited supplies to gain new knowledge of the curative possibilities of the drug rather than merely to repeat the therapeutic successes of which it is already known to be capable. In addition to a quantity allocated to the War Office for trial in wounds in the Army overseas, supplies of penicillin for research into the systemic treatment of selected infections have been allocated to four centres in this country; four others are receiving, or are about to receive, smaller supplies for the study of local treatment only. It has not seemed advisable at present that these centres should be made generally known, nor that an invitation should be issued to refer suitable cases to them, because the number of patients which can be dealt with are so limited that this could only cause widespread disappointment.

The policy of the therapeutic trials now proceeding is to treat conditions known to be susceptible only as far as is necessary to define the minimum effective dosage, the best methods of administration and any factors not yet studied on which success may depend, and to explore the possibilities of penicillin treatment in conditions hitherto unstudied from this point of view. Penicillin is known to have an action on many species of bacteria, some of which cause a great variety of lesions: these, together with the many forms which an infected wound may take, afford a wide field of study.

Even with the fullest coöperation of the Ministry of Supply and of the manufacturing firms, the difficulties in making penicillin on a commercial scale are still so formidable that the present output in this country is scarcely sufficient for the work in the four main research centres, and is only a minute fraction of the quantity which would be required if all cases of even a few specified infections were to be afforded treatment. Production on a greatly increased scale is being urgently undertaken both here and in the United States, but in both countries the requirements of the Fighting Services are likely to absorb most of the output for some time to come, and to name a date when adequate supplies will be available for general use is at present impossible. It will be appreciated therefore that requests for supplies of penicillin for the treatment of individual patients cannot, under existing conditions, be met.

Royal College of Surgeons of England

The honorary fellowship of the college, awarded to Dr. Naguib Mahfouz Pasha, professor of gynæcology in the Fouad University, in connexion with the centenary celebrations (*Lancet*, July 31, p. 136), was conferred on him on July 26 by Surgeon Rear-Admiral G. Gordon-Taylor, who alluded to the curious chance which found three members of the council of the college in Cairo. Addressing the new fellow Admiral Gordon-Taylor continued: "This chance though fleeting visit of mine to your country suggested to the president that I might be charged with the pleasing task of presenting you with the insignia of the fellowship amidst your colleagues in Cairo, the scene of your meritorious surgical work. In awarding you this honour, Naguib Mahfouz Pasha, the council of the Royal College of Surgeons of England recognises your distinguished work in your own special branch of surgery, and the pre-eminent position which you hold in the world of gynæcology; it also bears in mind the wondrous museum illustrating the problems of the maieutic art which was created by your own labours, and it further recognises your administrative ability, your efforts on behalf of medical [illegible]ation in Egypt and your staunch allegiance to the Allied [illegible] It is perhaps not inappropriate, although exceptional, that this honorary fellowship is being conferred upon you far beyond the precincts of that building in Lincoln's Inn Fields, battered and burned by air-attack. It is sometimes in adversity and misfortune that we find our truest friends, and you surgeons of Egypt made haste to assure us with your promises of aid to restore, recreate and reconstitute a temple of anatomy and pathology, worthy of the name of John Hunter and of his tradition.

NAPT Refresher Course

The committee on education in tuberculosis of the NAPT and the Joint Tuberculosis Council has arranged a refresher course for almoners, social workers and health visitors on the social side of tuberculosis work, with special reference to the scope and limitations of the Ministry of Health memorandum 266/T. The course will be held from Sept. 23 to 25 at the London School of Hygiene, Keppel Street, W.C.1, and further information may be had from Dr. Harley Williams, Tavistock House North, W.C.1.

A Charter for Health

The Anglo-Czechoslovak Founders' Committee is offering a series of prizes for the best essays on an inter-Allied charter of health. The competition is open to all members of the medical profession, to biologists and other research workers in services connected with health, and to nurses and medical auxiliaries. The last date of entry is Dec. 1, and further particulars may be had from Dr. Jan Swoboda, Health Charter Study Group, c/o Langdale House, London Road, Harrow-on-the-Hill, Msx.

Medical Honours

The Military Cross has been awarded for gallant and distinguished services in the Middle East to: Major R. M. Johnstone, mrcpe, ramc; Captain J. J. Hogan, lrcpi, ramc; Captain J. G. S. Holman, mrcs, ramc; Captain N. A. Subramaniam, ims; Captain C. Arumainayagam, iamc.

The RNVR officers decoration has been conferred on Surgeon Commander F. E. Stabler, frcs.

Prisoners of War

The following RAMC officers have been posted as prisoners of war: Captain B. H. M. Aldridge, mb edin.; Major R. C. Burgess, mb st. and.; Captain E. R. S. Phillips, mrcs; Captain L. D. Stone, mrcs.

Fifth Valuation

The summary report by the Government Actuary on the fifth valuation of approved societies shows that £22½ million was available for additional benefits, of which over £2 million is to be spent yearly on cash benefits and over £3½ million yearly on treatment benefits. At present nearly £2½ is being allocated annually to dental benefit.

Veterinary Fellowship

The first Wellcome junior fellowship for veterinary research has been awarded to Mr. John McGirr, b sc, mrcvs. Another fellowship will be awarded in April, 1944.

Royal Eye Hospital, London

A meeting of the clinical society of this hospital will be held on Friday, Sept. 24, at 5.30 pm, when Mr. V. E. Negus will give a talk on the relationship of ophthalmology and rhinology.

Sir Stanley Woodwark has been appointed master of the Society of Apothecaries. This is his third year in that office.

Sir Arthur Newsholme has left the residue of his estate to the London School of Hygiene and Tropical Medicine.

"Dicoumarol" in our issue of Aug. 14 (p. 195) should be spelled "dicumarol"; this is the collective trademark of the Wisconsin Alumin Research Foundation, which controls the use of the compound in the United States.

Appointments

Bell, A. W. L., frcse: RSO at the Woolwich Memorial Hospital.
Mills, N. L., mrcs: MO Tanganyika.

The following have been appointed examining factory surgeons:—
  Gillespie, J. M., mb edin., surgeon lieut.-commander rnvr;
  McKeown, F. Q., mb lpool;
  Paviere, H. D., dm oxfd, surgeon lieut.-commander rnvr;
  King, H. McKenzie, mb edin.;
  Nash, R. A., mrcs, drcog, for South Molton, Devon;
  Stone, E. M., lrcpe, for Saddleworth, Yorks; *and*
  Ludlow, W. J., mb belf, for Guiseley, Yorks.

FINDINGS IN 262 FATAL ACCIDENTS

G. R. OSBORN, M B MELB.

PATHOLOGIST TO DERBYSHIRE ROYAL INFIRMARY, DERBY CITY HOSPITAL AND BURTON-ON-TRENT GENERAL INFIRMARY

BEFORE this war the recognition of contusions of the phrenicocostal part of the lungs aroused the suspicion that injuries of the lungs are more frequent than is generally realised. During the war blast injuries have attracted [illegible] errors are commoner in the everyday accident case than in any other branch of medicine and surgery. Table I shows the main findings in an unselected and consecutive [illegible] Derby and Burton-on- [illegible] size and position of the [illegible] surprising if injuries of [illegible] as a tour of any accident ward seems to indicate—for here an accident appears to be something which damages the head, limbs or other part of the bony skeleton. Proof is now available that injuries of the body organs are just as common in ward cases which recover as they are in this series of fatalities.

TABLE I—MAIN FINDINGS IN 262 FATAL ACCIDENTS

Accidents without injury to brain or body viscera .. 78

Death due to	*Cases*	*Death due to*	*Cases*
Sepsis	23	Pulmonary embolism ..	5
Accident directly ..	9	Gas gangrene	5
Acute pulmonary œdema	9	Tetanus	5
Systemic disease	9	Anæsthetic and operation	4
Pneumonia	9		

(Multiple rib fractures without lung injury 3; gas gangrene as "pseudo-pulmonary embolism" 3.)

Accidents with injury to body viscera but not to brain .. 50

Death due to	*Cases*	*Organs injured*	*Cases*	*No. of organs injured*	*Cases*
Accident directly	42	Lungs	33	1	17
Pneumonia	3	Liver	22	2	14
Sepsis ..	2	Spleen ..	17	3	8
Gas gangrene	2	Heart ..	11	4	7
Pulmonary embolism	1	Large bowel	8	5	3
		Small bowel ..	6	6	1
		Kidney ..	4		
		Bladder ..	2		
		Pancreas ..	1		

(Acute pulmonary œdema 13; pseudo-head injuries 9; gas gangrene as "pseudo-pulmonary embolism" 1.)

Accidents with injury to body viscus and brain .. 47

Death due to	*Cases*	*Organs injured*	*Cases*	*No. of organs injured*	*Cases*	*Grade of head injury*	*Cases*
Head injury	27	Lungs	45	1	24	I	6
Equal ..	7	Liver ..	13	2	13	II	8
Body viscus	13	Spleen ..	10	3	3		
		Heart ..	8	4	4	III	11
		Large bowel	2	5	2		
		Kidney ..	2	6	1	IV	22

(Acute pulmonary œdema 15; "pseudo-head injury" 5; gas gangrene as "pseudo-pulmonary embolism" 1. Grade I head injuries trivial; grade II more severe but no large or certainly lethal injury; grade III extensive damage but no certainly lethal injury; grade IV too severe to expect recovery in any case.)

Accidents with injury to brain but not body viscera .. 87

Death due to	*Cases*	*Grade of head injury*	*Cases*
Head injury directly ..	42	I	14
Pneumonia	14		
Sepsis	12	II	31
Systemic disease ..	5		
Acute pulmonary œdema	6	III	29
Delayed lesions	5		
Gas gangrene	3	IV	13

[illegible] 1.)

TYPES OF PULMONARY CONTUSION

Brain lesions due to direct violence and contre-coup have long been recognised. The contre-coup lesion is typically much the larger and is often obvious when the direct lesion is slight or absent. These two types are also found in the heart and lungs with a third type due to "pincer" forces in V-spaces. The skull can be compressed in any direction; [illegible] the contre-coup lesion. [illegible] pressed from the front and [illegible] the spine being relatively fixed; hence the typical contre-coup lesion is posterior. The heart shows a fourth type of lesion which is dependent on its rhythmic contractions.

1. *Lung lesions of direct violence.*—These are rib markings, and are well seen in babies (fig. 1) and animals; they are shown in cross-section in fig. 2 (RM).

2. *Lung lesions from contre-coup.*—In a series of cases all stages in the development of this lesion can be seen. The earliest stage is a hæmorrhagic straight line on the lung in an almost constant position which corresponds with the angle of the ribs (fig. 2, PC 1). A row of blisters can often be seen in addition to the subpleural blood mark. The blisters appear to be the simplest lesion to produce; their occurrence in a straight line is striking but they are easily missed unless the examination is made in a good light. The hæmorrhagic line is often about 1 cm. wide and upwards of 20 cm. long, it does not usually reach the extreme base and is produced by varying combinations of subpleural hæmorrhage and hæmorrhagic concussion of the underlying alveoli. A common extension of this posterior contusion is to the upper part of the lung in the cupula pleuræ (fig. 3). This is an end space superiorly, just as the region of the angle of the ribs is posteriorly. X rays of this stage are shown by Thomas (1941) in a sailor exposed to an explosion. Fig. 4 shows a further stage in development. The straight edge can be seen medially on the left lung but there is considerable lateral and anterior extension. The lateral extension may become confluent with phrenicocostal contusions (as it almost does here) and rib markings. This photograph shows [illegible] right t[illegible] would [illegible] shows a gross bilateral contre-coup lesion. The relation to the angles of the ribs is well shown on both sides. The apparent pleural hæmorrhages were very small compared with the extent of the lesion. This is a roughly symmetrical hæmorrhagic concussion. The smaller hæmorrhages around the massive posterior and hilar ones are interesting; were these parts of the lungs in which the capillaries were functionally fully dilated at the time of the injury?

The posterior contusion has an important clinical difference from rib markings and the phrenicocostal contusions: it may be so massive that by its size alone it can produce symptoms and endanger life. It has been said that a typical feature of pulmonary concussion due to blast is that it is bilateral and symmetrical; this is probably the rule but fig. 5 shows a bilateral and symmetrical lesion in a road accident and the lesion is not necessarily symmetrical in blast. Animals correspond closely with human babies only. In animals Zuckerman (1940) has shown that the lung near the explosion may protect the further lung. This is the reverse of the common adult (human) finding in which the worse posterior contusion is apt to be in the lung away from the primary force. Motor cyclists commonly fall on the left side of their forehead and sustain a fracture which runs from the left temple through the ethmoids to the right anterior or middle fossa; the associated pulmonary contusion has been found only, or better developed, on the right side posteriorly.

A Home Guard, aged 25, intended to give a demonstration of bomb throwing to a squad. He made a bomb with explosive (thought to have been taken from a mine) placed inside a thin tin can. The bomb exploded while being held in his left hand beside his thigh; he died two hours later. There was extensive but relatively superficial damage to the thigh and groin [illegible] was not opened [illegible] on their free mar[illegible] but there was a [illegible] with some apical extension (cf. fig. 3), while the left lung (nearer the bomb) showed a very small posterior linear mark on the upper lobe only.

In most accidents, really definite evidence on the location of the primary force and whether or not it was bilateral is *not obtainable. The main reason for this is* that the primary force so often acts for a fraction of a

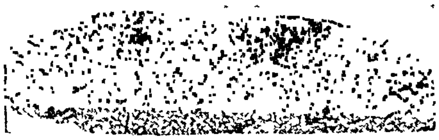


Fig. 1—" Rib markings " in the lung of a 7 months baby girl killed with her mother (26) in an air-raid (bomb fragment in her mother). The rib markings were well-developed on both sides and extended upwards of 1 cm. into the lungs; *they became confluent posteriorly on the right.* In this section two rib markings are easily seen; parts of a third are also present. Depressed fracture of the skull but no marks of any sort on the body; no ribs fractured. Rib markings as well-developed as these are almost confined to babies.

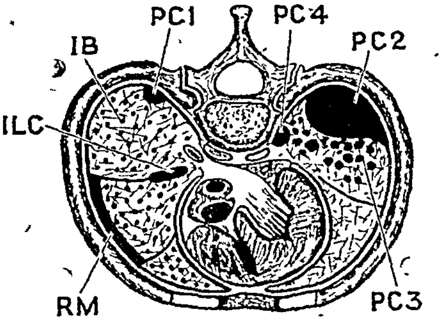


Fig. 2—*Pulmonary contusions in transverse section.* PC 1, early stage in development of posterior contusion. PC 2, larger posterior contusion. PC 3, outlying hæmorrhagic lesions of PC 2. PC 4, less common linear contusion at hilus. RM, rib marking. ILC, interlobar contusions and contusion of posterior part of mid lobe. IB, inhaled blood spots.

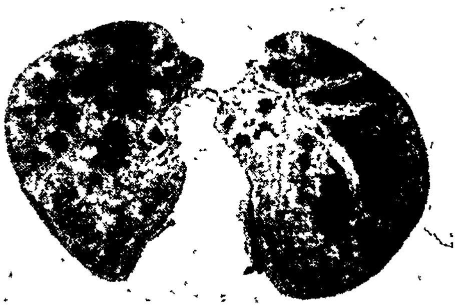


Fig. 5—Transverse sections of both lungs of a man of 26 showing large bilateral posterior contusions. He died two days after a motor-car accident with acute pulmonary œdema. The brain showed practically no direct injury but a fairly large contre-coup lesion.

second only and leaves no external marks. A man of 35 was seen recently in whom fractures of the upper five left ribs anteriorly were clearly due to direct violence; there was no injury of the left lung but a large posterior contusion of the right. The air-raid victims in this series have shown injuries due to many causes.

A slender woman of 30 who died fairly soon after a bomb struck a large building appears to have been killed by blast alone. She was deeply cyanosed and unmarked except for a few small scratches on her face. No bones were fractured anywhere. She had a double retrobulbar hæmorrhage with a little proptosis (fig. 6) and double middle-ear hæmorrhage from ruptured tympanic membranes. The right lung showed five parallel rib markings, two on the upper lobe and three on the lower lobe; these were closer together than usual and were evidently inflicted in expiration; the right lung showed no other injury. The left lung showed a well-developed posterior contusion and extensive acute œdema as a complication; there was little œdema of the right lung. The ileum showed multiple contusions, especially on the free border; these had not ruptured but there was a hæmorrhagic serous exudate in the lumen in these parts.

Hence (1) *if the lung absorbs the force of the incoming* ribs, as in babies and animals, the near lung may protect the further; and (2) if the alveoli transmit the force (see penny experiment, Sutherland 1940) the nearer lung may show less damage than the further (this is seen especially in adults with protective reflexes developed, more rigid chest walls, longer bronchial trees, &c.)

3. *Lung lesions from pincer forces.*—V-shaped spaces are weak spots in the thorax, since pincer forces can be applied to the sides; these contuse the limbs of the pincers or the structures in the V-space. The simplest example is the phrenicocostal contusion (fig. 4) which has been sufficiently described elsewhere (Osborn 1940). The posterior part of the right middle lobe is apt to be nipped between the upper and lower lobes. In air-raid and road victims this part of the lung often shows more or less complete hæmorrhagic consolidation; a gross example is shown in fig. 7 (see also fig. 2, ILC). In other cases the pincer forces meet posterior to the mid lobe; the contusions are then seen on the lower pleural surface of the upper lobe and the upper pleural surface of the lower lobe. Lesions of the right mid lobe are apt to be complicated because this is a favourite position for the ill-defined rib markings of adults.

The anterior margin of the lungs is an apparent exception to the danger of the V-space. I have seen contusion of this in one case only; it was very slight and on the left side. This is a V-shaped structure placed where the compressing force is typically applied; the line of retreat is free.

Cavity formation is fairly common in the most massive contusions. Such cavities have been most often seen in the basal parts of the lungs; the walls are smooth and formed of hard blood-clot (fig. 8).

NON-PENETRATING TRAUMATIC LESIONS OF THE HEART

1. *Contusions from direct violence.*—These may probably occur on any part of the front and margins of heart, but the left ventricle appears to be the usual site. This is not a common injury (Barber and Osborn 1941).

2. *Contusions from contre-coup.*—These are similar to the direct injuries and are usually due to impact with the vertebral column. The posterior part of the left ventricle appears to be the usual site. The small size of this lesion in the heart contrasts with the large contre-coup injuries of the brain and lungs. This also has been found infrequently.

3. *Pincer lesions.*—These are probably of everyday occurrence and are much the most important. The right pericardiophrenic angle is a V-space in which the heart and liver meet going in opposite directions in diffuse compressive injuries. The whole region may be contused, as in a man of 25 who rode a motor cycle into the back of a lorry. He developed acute pulmonary œdema within an hour of the accident; this responded to treatment but returned unexpectedly 48 hours later and proved fatal. He was a " pseudo-head injury "; no brain lesion could be seen. There was a bruise of the right auricle posteriorly which extended forward to the interauricular septum and posterior part of the mitral valve. The adjacent part of the liver was contused. A common associated liver injury has been found to be tearing through of the round ligament towards the falciform ligament so that the right and left lobes are partly separated. The common injury is not as extensive as in this case; it is a contusion of the right auricle at the entrance of the inferior vena cava. Some injury of the related part of the liver is so common with this lesion that impact of the two organs must be the main cause. Rebound after the impact and the heart beat may also be important factors because pericardial lacerations are apt to be associated. Contusions of the ventricles may be associated but are not the rule. This injury of the right auricle near the inferior vena cava is easy to overlook at autopsy—there is little doubt it was often overlooked in the early stages of this study and that contusions of the heart should be relatively more frequent than is indicated in table I.

4. *Lesions due to the heart's contractions.*—The heart differs from the other thoracic and abdominal organs in that it is a muscular organ contracting with considerable force. Definite pulls may be in existence at the time of injury, and it would be surprising if these did not play a part in producing the lesions seen afterwards. Auricular contraction may be partly responsible for the common lesion by the inferior vena cava; it is evidently important in those cases in which the auricle is pulled away from the ventricle (only seen posteriorly so far). At the base of the papillary muscles partial ruptures from the endocardial side may occur which are evidently due to their contraction (Barber and Osborn 1941). An extensive and purely subendocardial contusion of the left ventricle has been observed fairly often. In most cases this appears to be a pure shock effect since it is seen equally well in profound shock not due to accidents—e.g., a man of 44 had tabes and a right third nerve paralysis, he died unexpectedly with acute pulmonary œdema; the cause was rupture of a large aneurysm of the right side of the circle of Willis, no syphilitic heart lesion was shown but there was extensive subendocardial bruising. The subendocardial capillaries are evidently

damaged by the anoxæmia of shock and then ruptured by the sudden contraction of the left ventricle on a greatly reduced amount of blood.

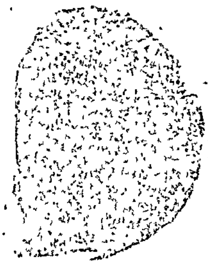
Cause of death.—Acute pulmonary œdema terminated *life in every case in this series in which death was not* instantaneous—e.g., rupture of heart. This occurred with a number of injuries which were apparently trivial. Some of these cases were diagnosed during life as head injuries though no head injury could be demonstrated post mortem.

Clinical considerations.—The common contusion at the posterior part of the right auricle is not directly on the *conducting system but it readily extends upwards* towards the sino-auricular node and especially antero-*medially towards the auriculoventricular node. Hence* disorders in the electrocardiogram should be common. Barber (1942) has shown that this is so, and he has since seen a case with transient nodal rhythm and another with transient auricular fibrillation (the latter a woman injured in an air-raid). Sigler (1942) arrives at similar *conclusions. It seems clear from these clinical and* post-mortem [illegible] death in one [illegible] another which [illegible] to a head inj[illegible] die with trivial contusions of the inferior vena cava region of the right auricle (or of the phrenicocostal part of the lung) when others show only transient signs and apparently make a complete recovery with the lesion overlooked far more often than not? As a provisional [illegible]

[illegible] its analgesic effects (see later under acute pulmonary œdema). I am in complete agreement with Sigler when he writes: "A definite psychoneurotic tendency or vagosympathetic imbalance is a factor that lends itself to greater cardiac disturbances produced by an injury."

RELATION OF LESIONS TO CAUSATIVE FORCE

It is not safe to deduce the lesions from even the most perfect history of the accident. In a general way, however, certain accidents have characteristic effects. The commonest accident in this series is a fall (in the street, at work, from moving vehicles and down various distances). This usually causes a fracture of the limbs or a head injury; lesions of the thoracic and abdominal viscera are not likely unless the fall is from a considerable height. Fractures of the spine were the usual finding in mine accidents; visceral injuries were not common but [illegible]me were severe. A miner, aged 50, who died 3 weeks [illegible]ter a compression fracture of the 1st lumbar vertebra [illegible]owed grey hepati[illegible] except [illegible] a very hard red [illegible] that in [illegible] 7. Miners no[illegible] spinal [illegible]ctures without cord involvement after a few weeks



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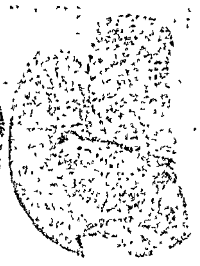

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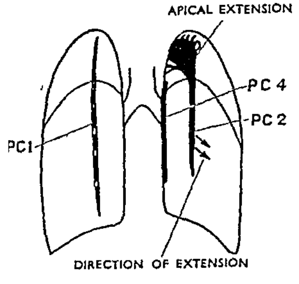
Fig [illegible] at the upper end. A large contusion about the posterior part of the mid lobe and many inhaled blood spots are shown

Fig. 8—Left lung of the same man. There is a large posterior contusion and a phrenicocostal contusion. (Note cavities in lower lobe, these have been seen in other large contusions.)

with pneumonia; in most it is not possible to demonstrate a definite pulmonary contusion, but many contusions are smaller than that just described and may have disappeared at death or else be confused with red hepatisation.

The heavier the motor vehicle the more certain is it that visceral injuries will be caused. They are the rule in motor lorry, bus and aeroplane injuries. The hardness of the opposing surfaces in railway accidents place most of them in a different class from motor accidents. Visceral injuries are also to be expected in bomb victims, especially in those from confined spaces. In other words, the probability of visceral injuries is roughly [illegible]rce. [illegible]le— [illegible] the [illegible]last [illegible]ome [illegible] the lungs by a motor vehicle is comparable in time and magnitude.

An RAF trailor weighing 5 tons 15 cwt. passed over the back of a sailor of 22; the speed was said to be 20 m.p.h. This means that a force of upwards of 1½ tons was applied for about 1/30th sec. The youth whose lungs are shown in fig. 7 fell off his cycle with a drunken vomit; while lying on the road he was run over by a car weighing about ½ ton; the admitted speed was 30 m.p.h.; a considerable force was



[illegible] ong; the lung was 24 cm. long PC 4 was 9 cm. long and associated with pleural laceration The posterior contusion with apical extension on the right lung is from a man of 25 injured in a motor-cycle accident. He also had contusions of the phrenicocostal fringe and left diaphragm, and a ruptured spleen.

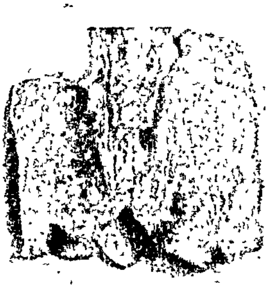


Fig. 4—Lungs of a youth of 16 run over by a motor-car. Large phrenicocostal contusion on the right; small one on the left. Fairly large posterior contusion on left with lateral extensions. Contusions of diaphragm and ruptures, of spleen and liver. Slight brain injury only. No marks on trunk and no fractures. Blood-alcohol 184 mg. per 100 c.cm. Death soon after injury

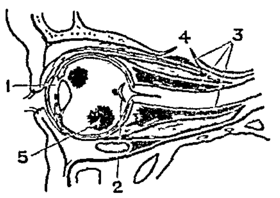


Fig 6—*The eye lesions of blast.* (Partly drawn from description of D. R. Campbell, *Brit med J.* 1941, I, 966) 1. Iridodialysis with intraocular hæmorrhage. 2. Crescentic choroid rupture near optic disc with small macular hæmorrhage 3. Retrobulbar hæmorrhage apt to cause proptosis 4 Upward fracture of orbital plate of the frontal bone. This will presumably only occur when this plate is thin. 5. Intraocular hæmorrhage from torn retinal vessel. (Note that no direct injury to the cornea has so far been described. *The lesions can be remembered* easily as a triple end-penny experiment: (a) iridodialysis at posterior part of anterior chamber; (b) choroid and macular lesion at posterior part of eyeball; and (c) the largest lesion is the most posterior of all—the retrobulbar hæmorrhage)

therefore applied for one or two periods of only about 1/45th sec., hence the absence of marks and fractures in the chest wall.

Blast causes a sudden diffuse compression of the chest and abdomen which is similar in many respects. When reading figures for blast times and pressures—e.g., Zuckerman 1940—two important points have to be remembered: (1) most of the lung lesions reported have been in victims in confined spaces; (2) "When a bomb explodes in a house its primary effect is to cause a blast wave which, meeting walls, blows them out. The effect is greater than blast in the open because the waves reflected from other walls add their effect to that of the initial blast, producing a more prolonged pressure and consequently a greater outward momentum." (Burnal 1941). We can do little better than guess at the figures for victims in confined spaces; the time will only be a fraction of a second but it will probably be appreciably longer than 1/150th sec. An air-raid victim may be subjected to a variety of forces besides pure blast, but these forces tend to summate in compressing the thorax and abdomen. Williams (1942) discounts Zuckerman's statement that pressures must be high (e.g., 100 lb. per sq. in.) to cause damage: "Even low pressures suddenly applied to the body can cause injury. . . . The maximum blast pressure which can be withstood without loss of efficiency is 2½ lb. per sq. in. . . . When enclosed in 'knight's armour' the maximum pressure which could be withstood was 7½ lb. per sq. in." These figures bring blast lesions more into the field of observations on hospital patients after air-raids, and with the pressures in everyday accidents on the road, where they may greatly exceed 7 lb. per sq. in.

RELATION OF ACUTE PULMONARY ŒDEMA TO SHOCK

Acute pulmonary œdema is met in a variety of conditions, especially those associated with shock—e.g., accidents, obstetric shock, sudden deaths from coronary disease and cerebral lesions, pulmonary embolism, and poisoning of various kinds. It has been found to complicate especially those accidents in which the brain, heart or lungs are injured. It may, however, be found in any accident (e.g., fractures of the legs) provided there has not been excessive blood loss. Similar lesions are seen in different subjects with and without acute pulmonary œdema—a given lesion will not always cause it. It is a common terminal event and is incompatible with life if it persists more than a short time. It must not be looked on as just a terminal event, for it causes death in a number of relatively trivial injuries, injuries from which we know many other people recover. The incidence of acute pulmonary œdema (APO) in the present series of fatal accidents was as follows.

	Total cases	With APO	%
(*a*) Without brain or visceral injury ..	78	9	12
(*b*) With visceral injury	50	13	26
(*c*) With brain and visceral injury ..	47	15	32
(*d*) With brain injury	87	25	29
	262	62	24

Although it has so many causes the immediate pathology of the great majority of cases appears simple and constant; it is merely one of the most dramatic manifestations of vasomotor failure—i.e., shock. The histological changes are essentially those of shock: arteriolar spasm with dilatation of capillaries and venules resulting in stasis and œdema. Three stages can be recognised. In the preliminary stage of congestion without alveolar exudate (fig. 9) there is little or no damage to capillary endothelium. In the second stage the lung capillaries are little more dilated but their permeability has increased sufficiently to allow a fluid exudate to develop in the alveoli. In the final stage capillary dilatation is gross, damage to capillary endothelium is probably irreparable and red blood-cells pour freely into the alveolar spaces (fig. 10).

Acute pulmonary œdema may develop very rapidly. Thus a youth of 19 hanged himself on learning that he had failed in technical college examinations. He had had a large meal recently; his neck was not broken; there gross general hæmorrhagic acute pulmonary œdema. 168 cases of "sudden death" from coronary occlusion (75 of which had demonstrable thromboses) acute pulmonary œdema was present in 93 and should have been clinically obvious in 46 or just over quarter of the cases. Most of these are rapid rather than sudden deaths. More nearly sudden are those cases of coronary thrombosis in which the left ventricle ruptures from the infarction; 16 such cases have been examined in addition to the 168 just noted, and there was no suggestion of pulmonary œdema in 15 of these. Acute œdema does not therefore develop immediately, but it may reach an advanced hæmorrhagic stage in only a minute or two. A nervous mechanism appears to initiate the lesion in most, if not all, cases.

TABLE II—TYPE OF ACCIDENT RELATED TO LESIONS

—	A	B	C	D	Total
Cycle	1	1	3	6	11
Motor-cycle ..	1	2	4	8	15
Motor-car ..	6	8	11	19	44
Motor lorry and bus	2	11	11	2	26
Aeroplane crash	0	1	2	0	3
Bombs	1	11	9	3	24
Railway train ..	2	2	0	4	8
Fall	32	3	2	36	73
Cuts, blows, &c.	16	3	2	5	26
Bullet	1	5	0	2	8
Factory ..	5	0	2	1	8
Mine	11	3	1	1	16
—	78	50	47	87	262

A = Accidents without injury to brain and body viscera, including spine.
B = Accidents with injury to body viscera but not to brain.
C = Accidents with injury to body viscus and brain.
D = Accidents with injury to brain but not to body viscera.

The published work in English on the clinical aspects of acute pulmonary œdema is scanty. In his comprehensive survey Luisada (1940) rejects the old theory that it is caused by left ventricular failure. (The many perfectly normal hearts seen with gross acute pulmonary œdema in the present series cannot be reconciled with this cardiac view.) If a neurogenic alternative is accepted he says two types have to be admitted: (1) from direct excitation of nerve centres, e.g., in head injuries; and (2) from reflex causes, the stimuli for which may arise in the heart and large arteries or in the hollow viscera and lungs. The well-illustrated experimental study of Farber (1937) should also be studied.

A study of other organs in cases which die with acute pulmonary œdema shows that it is exceptional for the vasomotor failure to be confined to the lungs. The kidneys appear to be about equally sensitive. Figs. 11, 12 and 13 show gross congestion of the efferent circulation with hæmoconcentration. This does not regularly involve the glomerular capillaries but may do so to such an extent that an albuminous or sanguineous exudate appears in Bowman's capsule. The capillaries about the thin segments of Henle's loops are often most dilated. This circulatory failure causes the deep renal cyanosis seen at autopsy, and, in some cases which survive an hour or more, varying degrees of necrosis of the convoluted tubules and œdema of the interstitial tissue. Œdema may be greatest about the collecting tubules (see fig. 14). If the patient survives a few days the proximal convoluted tubule may be found to be lined with flattened epithelial cells with pyknotic nuclei but a well-preserved brush border; the lumen is then abnormally large and filled with an albuminous granular material, while casts are numerous in the lower parts of the tubules. These changes are well shown in fig. 15 taken from the kidney of a man of 24 who passed into a state of severe shoc after a cerebral cortical operation and died 2¾ days later after the operation he passed only 9 oz. of urine; his blood-pressure could not be recorded most of the This appears to be the reverse of the normal physiolog finding that during diuresis the lumen of the proxim convoluted tubule is large and the lining cells are low flattened. The changes in the nephrons are all degenerative and evidently depend simply on the circulator failure of shock. Shock is found in many condition besides the accident cases but however caused the rena lesion seems to be the same; anoxæmia is probably th main cause. A uræmic state develops in many accide cases and is often unsuspected (see table III). In som accidents this uræmic condition appears to be the real

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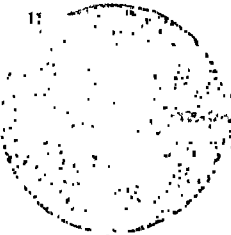

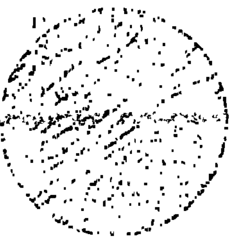

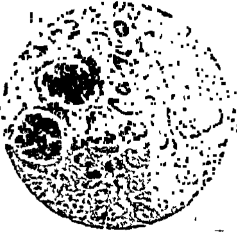

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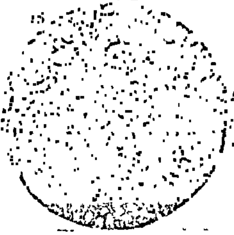


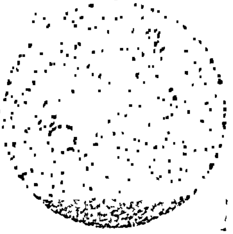


Fig. 9—Lung, showing early stage of acute pulmonary œdema [illegible] and he died with acute pulmonary œdema.

Fig. 10—Lung, showing hæmorrhagic acute pulmonary œdema in a youth of 19 who died from a ruptured aneurysm of the middle cerebral artery Capillary dilatation is so gross that alveolar outlines are difficult to show. This is the third stage of the lesion in which capillary permeability is so greatly increased that blood-cells pour into the alveoli.

Fig 11—Kidney from a woman of 20 who died about 18 hours after being knocked over by a motor cycle. Severe head injury; no injuries to body viscera. Death was with acute pulmonary œdema (Note gross dilatation of the efferent vessels in the renal cortex)

Fig. 12—Kidney from same section as fig 11 to show gross dilatation of efferent vessels about the renal collecting tubules These renal vascular lesions are almost constant in acute pulmonary œdema No constant changes have been found in other abdominal organs.

Fig. 13—Kidney, showing gross dilatation of efferent vessels about Henle's loops and convoluted tubules in a slender woman of 30 whose death appears to be due to blast alone. She had double retrobulbar hæmorrhages, double middle-ear hæmorrhages, no skull injuries, 5 rib markings on the right lung and a posterior contusion of the left with acute œdema. The packing of the red cells indicates hæmoconcentration and stasis.

Fig 14—Kidney, showing necrosis of convoluted tubules and œdema of interstitial tissue in a man of 63 who died with acute pulmonary œdema 24 hours after a double compound fracture of the legs

Fig. 15—Kidney from man aged 24 who died of shock 2½ days after brain operation. Only 9 oz. urine was passed in this time; blood-urea 223 mg. per 100 c cm. (Note flattened epithelium lining proximal convoluted tubules, granular material (and casts) in abnormally large lumen, and some interstitial œdema) This case also showed ischæmic central-zone necrosis of practically all liver lobules (anæsthetic was gas-oxygen with a little ether)

Fig. 20—High-power view of alveoli in a massive posterior contusion in a woman of 40 killed in an air-raid. The alveolar capillaries are compressed by the hæmorrhage into the alveoli; this crowding of alveolar nuclei makes the boundaries obvious but the ruptures through which the blood has escaped are completely masked *Histologically this lesion is identical with similar concussive lesions in civilian accidents and with published photomicrographs of pure experimental blast lesions.* In acute pulmonary œdema the capillaries are quite different.

cause of death, but it is probably rare for the changes to be as severe as this. Many ward cases show transient uræmic states apparently followed by complete recovery table IV).

TABLE III—BLOOD-UREA AFTER VARIOUS ACCIDENTS, AND IN OTHER CONDITIONS ASSOCIATED WITH SEVERE SHOCK. KIDNEYS PREVIOUSLY NORMAL

—	Sex and age	Type of accident or other condition	Time after event	Blood-urea (mg. per 100 c.cm.)
1	F 44		1 hr.	36
2	M 32		1 hr.	32
3	M 43		5 hr.	64
4	M 20		5 hr.	72
5	F 13		5 hr.	76
6	M 36		8 hr.	24
7	M 50		10 hr.	65
8	M 61		12 hr.	96
9	M 56		26 hr.	140
10	M 49		36 hr.	211
11	M 47		48 hr.	131
12	F 2		4 days	32
13	M 55		5 days	300
14	F 19		6 days	105
15	M 70		7 days	388
16	M 21	Fractured pelvis	8 days	391
17	M 1	"	8 days	72
18	F 52		8 days	380
19	M 18		9 days	437
20	F 73		11 days	421
21	M 59		14 days	113
22	M 55		20 days	297
1	F 22	PPH ; retained placenta	1 day	194
2	M 24	Postoperative ; brain case	3 days	223
3	F 27	Criminal abortion	5 days	446
4	F 51	Postoperative ; colon	6 days	110
5	M 22	Addison's disease	17 days	81
6	M 49	Sulphuric acid poisoning	10 days	324

Similar vasomotor changes have been found in the pituitary and suprarenal glands, though not as frequently. The essentially vasomotor nature of the changes is shown by the fact that the liver, heart and brain are rarely

TABLE IV—SERIAL BLOOD-UREAS IN FOUR SHOCKED CASES WHICH RECOVERED

—	Sex and age	Lesion	Time after event	Blood urea (mg. per 100 c cm.)
1	M 21	Aeroplane crash ; fractured spine	18 hr 42 hr. 7 days	96 80 40
2	M 27	Fractures of both arms and legs	6 hr. 24 hr. 2 days 4 days 6 days	57 90 76 76 40
3	F 41	Ruptured ectopic gestation ; operation	1 day 2 days 8 days 10 days 12 days 14 days 15 days 18 days 21 days	272 250 323 344 305 284 156 105 48
		UC test at 4 mths, 2·4%	4 mths.	8
4	F 37	Antepartum hæmorrhage	2 days 3 days 5 days 7 days 9 days 17 days	110 114 186 272 [illegible]
		UC test at 4 mths, 2·1%	4 mths.	

UC = Urea conc.

affected. In only one case has ischæmic central-zone necrosis been seen in the liver, this was a man with a double leg fracture who had had an ether anæsthetic. Contrary to the old conception of the "splanchnic pool" the vessels of the bowel have not been found congested, and neither have the vessels of undamaged skeletal muscle (rectus abdominis and vastus lateralis usually examined).

These considerations may throw some light on phenomena of shock. The word "shock" is a poor term for "peripheral circulatory failure" but it is probably too well established to be abandoned. The old conception of "primary" and "secondary" shock is too simple to cover the observed facts. A more rational terminology is to recognise three types of primary shock: (1) psychogenic, vasovagal or fainting; (2) neurogenic, which is a "C" fibre effect; and (3) hæmatogenic, of uncertain existence, corresponding with the old idea of secondary shock. "Secondary" shock should refer to the secondary effects of the primary peripheral circulatory failure—acute pulmonary œdema, uræmia, more obscure ductless gland lesions, &c. It has been obvious that the degree of primary shock in an accident case and the liability to acute pulmonary œdema are not directly proportional to the severity of the injuries, nor as a general rule do they depend on the location of the injuries.

Neurogenic "C" fibre and hæmatogenic shock should be directly related to the type and severity of the accident. This type of shock is seen well in the many cases reported from the battlefield, where men have carried on for some time with injuries which would almost certainly have been associated with rapid shock in civil life. The variable factor is the psychogenic shock; this may be very deep and may occur before injury, immediately after injury or a considerable time after injury—e.g., a woman blood donor gave just under a pint of blood with no reaction, she had a cup of tea and rested half an hour, she then walked around in the normal manner of most woman donors but fainted in the street later on. Some donors faint before the needle is inserted into the vein; others when a few ounces of blood have been given. Fainting depends on the type of person and cannot be foretold by examination. Some years ago I gave, as a routine, morphine gr. $\frac{1}{4}$ to every blood donor a short time before bleeding; this resulted in the complete abolition of the psychogenic shock. A patient with a simple fracture who is profoundly shocked immediately after his accident is in a faint. This faint promptly removes "A" and "B" nerve-fibre conduction, so that true neurogenic or "C" fibre shock is likely to come on more rapidly and to be more severe than it would be otherwise. Psychogenic shock may summate with the other types of primary shock, making them more severe and precipitating secondary lesions (acute pulmonary œdema, &c.) in cases with lesions which should have recovered uneventfully. The control of psychogenic shock by the injection of an adequate dose of morphine is probably more important than the use of morphine to control pain; this injection should obviously be given as soon after the accident as possible. In spite of suggestive experimental results reported by Luisada, sedative drugs are not likely to affect acute pulmonary œdema resulting from causes other than psychogenic. Thus a man of 35 sustained a grade 3 head injury from a blow, and 4 hours later died with acute pulmonary œdema; the blood alcohol was 327 mg. per 100 c.cm. It is difficult to imagine a man as drunk as this fainting. Morphine has not prevented the development of acute pulmonary œdema in progressive head injuries, and several cases of classical acute pulmonary œdema have been seen in deaths on the operating-table under general anæsthesia. One of the latter was a girl of 17 who was thought to have acute appendicitis but had acute salpingitis; her pituitary gland was notably congested and she had a large thymus. Does the thymic state predispose to pulmonary œdema? Two accidents in the series were in thymic subjects and both died with acute pulmonary œdema; one was a man of 29 with a leg injury and the other a youth of 17 with a relatively trivial head injury.

In a peculiar group of cases acute pulmonary œdema develops unexpectedly and proves fatal about 48 hours after the accident. Such cases are the phrenicocostal sinus tusion previously reported (1940); the motor cyclist 1 25 noted in heart injuries, a nurse aged 40 who died 48 hours after apparent recovery from a suicidal attempt at drowning, and a man of 53 who was thought to be ready to go home after a trivial head injury associated with a small left posterior pulmonary contusion. These cases are surprises and some at least are probably late psychogenic shock. Many more severe injuries become definitely worse about this time; the problem is obviously complicated since the true secondary lesions of shock are now becoming manifest.

The morbid anatomy of pulmonary contusions appears simple in those who are killed outright, but in some who survive a while hæmorrhagic acute œdema adds the greatest confusion (see fig. 16). The microscopic analysis is generally fairly simple however. Fig. 17 shows the difference in the alveoli in hæmorrhagic concussion and hæmorrhagic œdema. Figs. 18 and 19 show a general similarity in very low power views (× 3) but fig. 20, which is a high power view of an injury, contrasts sharply with the high power view of œdema (fig. 10 and Farber's illustrations). In most cases acute pulmonary œdema is a generalised lesion of both lungs; the damaged capillaries are naturally subject to hypostatic effects so that the posterior parts are often in a more hæmorrhagic stage than the anterior. It may be a localised lesion however—for example, one case showed œdema of the right upper lobe only and this was the site of two rib markings; another case showed no œdema of the right lung, which had five rib markings, but extensive œdema of the left which had a posterior contusion.

SIGNS AND SYMPTOMS OF PULMONARY CONTUSION

It can be stated definitely that the shock, anxiety, restlessness, cyanosis, dyspnœa and so on described for cases of pure "blast" lungs may also be found in ordinary accident cases. The symptoms are readily ascribed to other causes unless the lesions are the result of a bomb explosion.

The side of the chest with the lung injury is typically almost fixed in the inspiratory position. This sign appears to depend on the coincident bruising of the intercostal muscles, &c.; it has been found a number of times when X rays showed no lung lesion. In the resuscitation ward after air-raids lung injuries have so far been easily detected by auscultation.

DIAGNOSTIC PITFALLS

Pseudo-head injuries.—The natural tendency of most injuries of the lungs, heart, liver and spleen is to resolve without treatment. The patient is usually in bed long enough because of a head or limb injury. It is surprising at autopsy a few days after an accident to see quite large tears of the spleen and liver healing spontaneously. Unless there is progressive hæmorrhage these visceral injuries are apt to pass undiagnosed; this is not usually to the detriment of the patient. In this series of 262 unselected cases, 137 were diagnosed as head injuries; of these, 9 had no demonstrable head injury and in another 5 it was so trivial that it was not likely to be responsible for the patient's condition. This means that about 1 in 10 have not got the head injury they are being treated for. The confusion appears to arise from the coma of shock being diagnosed as the coma of concussion, and the differentiation of these two states is clearly one of great difficulty. The notes of some of these pseudo-head injury cases contain comments such as "concussed, unconscious, hears questions but will not answer"; that is not a description of true concussion.

Pseudo-pulmonary embolism.—In 6 cases the house-surgeon informed me of the sudden and unexpected death of a patient thought to be progressing well; death was thought to be the result of pulmonary embolism. Five of the deaths took place between 2 and 10 days of the accident; one was 19 days after it. In these ca pulmonary emboli were not found and there was no thrombophlebitis of great veins; death was the result of undiagnosed gas gangrene. *Bacillus welchii* was the organism except in the patient who lived 19 days and was infected with the *Vibrion septique.* The case of malignant œdema had been treated with sulphapyridine; the others had had no drug of this group. The early stages of gas gangrene are easily overlooked or discounted, and the risk is increased by the modern closed methods of treatment. In the absence of routine autopsies there can

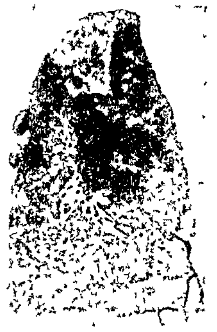


Fig 16—Right lung of a man of 45 who died with hæmorrhagic acute pulmonary œdema about 2 hours after falling 45 feet No marks on the chest and abdomen and no ribs fractured This is a confused picture compounded from a posterior contusion with hæmorrhagic bullæ, inhaled blood spots (seen best at apex), contusion of the mid-lobe region and hæmorrhagic acute œdema

be little doubt that we are ignorant of the real incidence of deaths from gas gangrene in England at present. Had bacteriological examination of wounds been a routine procedure these 6 cases would probably have recovered. A wound with numerous gas bacilli must be treated seriously even if the surgeon regards the case as a gas contamination only. The rapid deaths in these cases were probably due to the development of septicæmia.

Uræmia.—As might be expected from the results in table III, uræmic symptoms occur in a significant proportion of accident cases. Few of these cases are in danger of being diagnosed as chronic nephritis because in the presence of a definite physical injury the blood and urine are not apt to attract attention.

A miner, aged 55, fell and sustained a relatively trivial compression fracture of the 9th thoracic vertebra, there was no cord injury. He tried to carry on with his work. About 48 hours later (a significant time in many accident cases as noted under shock) his condition deteriorated rapidly, and on the fourth day vomiting began and persisted with distressing frequency until his death on the 24th day. He had most obstinate constipation and had he not been passing flatus would have been explored for intestinal obstruction. On the 20th day his blood-urea was 297 mg. per 100 c cm.; urine-urea was 1 5%. He died with an extensive bronchopneumonia. The kidneys had obviously been normal before the accident, the changes were those described previously Death was ascribed to uræmia of chronic nephritis, doubtless this was largely due to the fact that he was completely deaf and a satisfactory history was unobtainable.

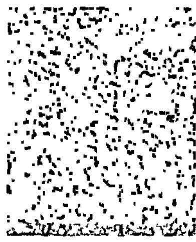
THERAPEUTIC PITFALLS

Pulmonary embolism.—Aschoff (1924) wrote:

> "No matter how carefully one will handle the factor of sepsis and antisepsis, he will not be able to prevent the ccurrence of femoral thrombosis until he will provide for the roper circulation of the blood in the lower extremities For his purpose it will suffice if after operative procedures the xtremities are raised *or passive motion carefully instituted.*"

hrombi liberated from the femoral veins (usually the eft) cause the great majority of deaths from pulmonary mbolism This tragedy is always unexpected and is ommonest 7–10 days after a simple operation. It annot occur once the clot is well organised to the vein vall and "white leg" is established. In this series it aused about 5% of deaths in patients without head njury, it was not found with head injuries. The restlessness of the head injuries may be the reason for its absence. In one case—a woman of 41—the embolism occurred during manipulation of a fractured leg under general anæsthesia on the 9th day; there was sudden collapse on the table. A woman of 53 went to bed for simple bruises of the right arm. She died suddenly with a pulmonary embolus from the left femoral vein on the 11th day; had she kept up as she should there is little doubt she would still be alive. Two more cases were women of 55 and 66 with fractures of the lower limbs, the fifth was a woman of 56 with an injury to the groin, and the sixth a man of 55 with a simple phrenicocostal pulmonary contusion. Pulmonary embolism will continue as a disaster until surgeons realise its pathology and understand that its occurrence indicates that they have managed the case badly.

Acute pulmonary œdema.—If acute pulmonary œdema has not reached too advanced a stage and is not the result of a progressive lesion it should respond to adequate doses of morphia and venesection Reasons have been given for regarding acute pulmonary œdema as a secondary effect of shock. The standard treatment of shock is transfusion of plasma or blood. There is little



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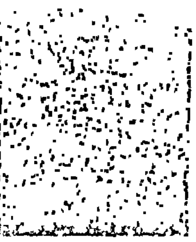

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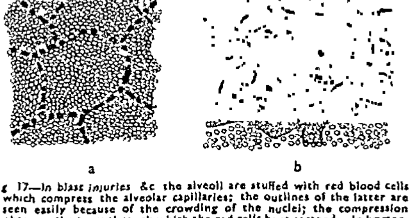
Fig 18—Low-power view (× 3) of massive contusion of lung of woman of 40 killed in an air-raid Compare with similar magnification of acute pulmonary œdema (fig 19)

Fig 19—Low power (× 3) view of lung of youth of 19 who died of acute pulmonary œdema 4 hours after rupture of cerebral aneurysm (see fig 10) The same dilatation of alveolar ducts, &c is seen as in fig 18 Histologically there is a great difference in the lesions

cases must be remembered.

lungs is present, its development is favoured by whatever causes stasis or increase in the volume of the blood in the lungs." In this series acute pulmonary œdema occurred in 62 cases, or nearly 24%. The type of case is instructive. With four exceptions they were accidents in which there had been little or no blood loss. The four exceptions were men between 13 and 65 (two with leg and two with arm fractures) who were transfused three to four pints of plasma and blood—probably more than they had lost. Findings so far indicate that blood loss protects against acute pulmonary œdema and that transfusions which raise blood-volume above its original level may precipitate acute pulmonary œdema and so be the real cause of death. We urgently need an immediate method for determining blood-volume so that blood-transfusion can be raised to a more scientific level; this is not likely to be found.

A rough test for shock which needs transfusion can easily be made. Shock is peripheral circulatory failure and can be tested by examining the capillary circulation in the lobe of the ear. Warm the lobe and prick it with a cutting-edge needle; normally this wound can be kept bleeding by milking almost indefinitely (the finger cannot). If bleeding is free transfusion will only be needed if the hæmoglobin percentage is too low. If



a

b

Fig 17—In blast injuries &c the alveoli are stuffed with red blood cells which compress the alveolar capillaries; the outlines of the latter are seen easily because of the crowding of the nuclei; the compression obscures the tears through which the red cells have escaped In hæmorrhagic œdema the capillaries are so dilated that their outlines are obscured and red blood-cells are easily seen pouring into the alveolus (a) alveolus in blast, (b) alveolus in acute pulmonary œdema.

bleeding is difficult shock is present; the deficiency in plasma-volume can be roughly estimated from Black's table after reading the hæmoglobin percentage. In all large tranfusions listen to the lungs at intervals.

Tetanus.—Five cases of tetanus are included; a number were seen before this study began. Some were trivial wounds from which a splinter had not been removed; these had not seen a doctor. Doctors failed to give antitetanic serum to such wounds as a nail passing right through the foot of a farmer's wife and a pocketed wound 3 inches in diameter with surface injury to the patella in a boy of 10 who fell off a swing. The early diagnosis of tetanus is difficult. Thus a woman came to the casualty department early one morning and said she had lock-jaw; she had cut her thumb while cleaning her husband's razor the previous afternoon. The casualty officer sent her home saying, quite rightly, that tetanus could not develop in such a short time. She returned late in the afternoon with the diagnosis quite obvious. At autopsy the tetanus was found to have come from the uterus; an abortion had been induced by *slippery elm which was still present; there was a mixed* infection from which *B. tetani* were recovered. General practitioners who treat wounds must use more judgment in the prevention of tetanus; it is a more glaring mistake than pulmonary embolism.

SUMMARY AND CONCLUSIONS

In the brain, lungs and heart injuries from direct violence and contre-coup are found.

The lungs and heart also show lesions due to "pincer" forces in V-spaces.

The heart shows a fourth type of lesion which depends on the association of its rhythmic contraction with the injuring force.

Acute pulmonary œdema is the commonest complicating lesion of all these injuries. It is suggested that this is only the most dramatic manifestation of peripheral circulatory failure or shock. This unfortunate relationship calls for judgment in giving transfusions.

In a general way the type of accident has a bearing on the lesions to be expected—the greater the force the higher the probability of lesions of the body viscera. There is no substitute for examination in diagnosis.

Diagnostic errors are not infrequent. Pseudo-head injuries number about 1 in 10 of the cases treated for head injury. Overlooked gas gangrene was the next commonest error.

Pulmonary embolism indicates bad management in most cases.

The accurate diagnosis and treatment of the "ordinary" accident case may be beyond the powers of any single specialist. No satisfactory solution of the problem can be seen except the general establishment of "combined clinics" as advocated by Prof. A. O. Whipple of New York. This would mean that the surgeon in charge would, as a routine, see new cases with specialist surgeons (ENT, &c), physicians, radiologists and pathologists. Routine staff rounds on the pattern of those at the Presbyterian Hospital, New York, should make deaths from "pseudo-pulmonary embolism," &c. impossible. The present method in which a single doctor treats all casualties should be stopped.

I am indebted to Major T. H. Bishop, HM coroner for Derby and Burton-on-Trent, who has made this study possible in the hope that more accurate diagnosis may reduce the wastage of life from accidents. I am also indebted to Detective-Sergeant J. S. Fayers for help with photography.

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Lord De La Warr has been appointed chairman of the Agricultural Research Council in place of the late Sir Thomas Middleton, and Prof. I. de Burgh Daly, FRS, a member, in suc- to Sir Joseph Barcroft whose term of office has expired.

PROPHYLACTIC INOCULATION
WITH THE O ANTIGEN OF *BACT. SHIGÆ*

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THE toxicity of *Bact. shigæ* has precluded its use as an ordinary prophylactic vaccine. A dose as small as 200 million organisms has been considered (Dudgeon 1929) too toxic to be tolerated by man. Detoxicated modifications have been suggested, and employed from time to time, but they have not established themselves as useful and practicable vaccines.

The following experiments were designed to demonstrate the reactions and immunological response in man to inoculation with the O antigen of *Bact. shigæ*. This antigen was obtained by extracting an acetone dried culture of the smooth variant of *Bact. shigæ* with 90% phenol according to a method already described (Morgan and Partridge 1941). The preparation consists of a complex of specific bacterial polysaccharide and conjugated protein molecules, the polymolecular aggregate being free from other antigenic constituents, such as the neurotoxin, and from non-essential substances derived from the organisms or the culture medium. The O antigen extracted from the organisms by phenol or diethyleneglycol induces the formation of specific agglutinins and precipitins in the rabbit and horse (Morgan 1937, Morgan and Partridge 1940, 1941, Steabben 1943) and in mice (Schütze 1943), and protects mice prophylactically against several lethal doses of living, fully toxigenic *Bact. shigæ* (Schütze 1943). Furthermore it has been established (Steabben 1943) that the rabbit immune serum, when given to mice intravenously, will also afford protection against a similar test dose.

In the light of these results it seemed of interest to determine the nature of the immunological response engendered in man, after receiving a dose of the O antigen preparation that would give rise to no untoward reactions. To this end 12 volunteers were given two subcutaneous doses, each of 0·1 mg., of the phenol extracted O antigen, which was rendered sterile by filtration through a Berkefeld filter-candle and was administered without the addition of preservative—though animal experiments had shown (Schütze 1943) that the addition of 'Merthiolate' (1 : 10,000) or formol (0·1%) is without deleterious action on the antigen preparation.

Since it was known (Schütze 1943) that an interval of 6 weeks between the doses of antigen gives rise to a more effective immunity than the customary space of 1–2 weeks, the second immunising dose was given 6 weeks after the first. Samples of serum were taken before and after immunisation.

LOCAL AND GENERAL REACTIONS

As was to be expected, the reactions following inoculation varied considerably from person to person. Pain and swelling at the site of inoculation occurred in varying degree: in one case it was described as very painful and lasted for 3 days. For the most part, however, the local reaction was slight and not incapacitating. The general symptoms began about 2 hours after injection; feelings of malaise and attacks of shivering ensued and reached their maximum in 4–5 hours. Rises of temperature occurred within the first 24 hours and ranged from 99° to 102° F.; at the end of this time the symptoms in most cases quickly subsided, indicating a rapid absorption of the antigen. After the second inoculation all symptoms were less definite and often negligible.

AGGLUTINATION TITRES

In the light of observations to be published elsewhere, the bacterial suspension used in these tests was prepared from a smooth strain, not serum sensitive, which was grown on agar for about 4–5 hours at 37° C. By using a culture of this type abnormally high titres, which do not accurately reflect the true immune-state, were avoided.

The sera of all 12 subjects sampled before immunisation showed no agglutination at a dilution of 1 . 6. Tested 7 days after the second inoculation they all showed a definite agglutinin response. The mean titres of the two groups of samples collected 7 and 14 days after the second dose did not vary significantly and were about 1:30. I immunisation has raised tl serum by at least 500% what is achieved with Vi and O agglutinin response in anti-typhoid Stokes (1941) accepted or more as a significant With samples taken 10–14 days after the second dose of alcohol-killed and preserved they recorded a s ulated for Vi and in 7

MOUSE-PROTECTION TEST

To determine the protective value of the sera, mice were each given intraperitoneally 0 2 ml. of pooled serum 24 hours before a test dose of living Shiga bacilli The six sera included in this pooled sample possessed agglutinin titres ranging from 1:25 to 1:50. Other mice given pooled normal serum in similar fashion and inoculated with the same number of bacilli served as control. The infecting inoculum consisted of a 4-hour agar culture of the fully toxigenic strain, "Bucharest," suspended in 0 5 ml. of 5% mucin, and was injected intraperitoneally in a dose of 50 million organisms. Although practically all deaths occurred in the first 3 days, the mice were kept under observation for a further 7.

In a first test, of the 12 control mice that were given normal serum, 8 succumbed to the infection, while of the 12 mice that had received immune serum, all survived.

In a second experiment, the test dose was increased to 100 million organisms and in addition a group of mice a subject 7 days was included as a bacterial protein 1 in four groups lower, 1:6 to 1:12 (6 individuals) or higher, 1:25 to 1:50 (6 individuals) and whether sampled 7 or 14 days after the second inoculation. The general method of test remained unchanged.

		Survived
Controls	TABC serum	0 out of 6
Controls	pooled normal sera	1 out of 12
Mice	low-titred sera, 7 day sampling	4 out of 12
Mice	low titred sera, 14 day sampling	6 out of 12
Mice	higher-titred sera, 7 day sampling	8 out of 12
Mice	higher titred sera, 14 day sampling	7 out of 12

From these results it is clear that inoculation with the isolated O antigen of *Bact. shigæ* induces a definite degree of immunity in man without the accompaniment of exaggerated local or general reactions. Experiments in mice (Schutze 1943) indicate that if formolised anti-Shiga vaccine is used, to protect to the same extent as with 0 1 mg. of the phenol extract, it would be necessary to inject in man an inoculum of 3500 million organisms of this vaccine, a dose which would undoubtedly give rise to serious local and general reactions.

As a result of these preliminary studies it would seem profitable to immunise ho have to reside in areas to be encountered. The to embrace field conditions can alone give conclusive evidence that an immunity against infection with *Bact. shigæ* results from such prophylactic vaccination.

SUMMARY

Twelve adult volunteers given two inoculations of a preparation of a phenol-extracted O antigen of *Bact. shigæ* with an interval of 6 weeks between the doses all developed specific agglutinins, the titres rising from less than 1 6 in each instance to an average of 1.30 The immune serum protects mice against infection with a fully toxigenic strain of *Bact. shigæ*.

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AMINOACRIDINE ANTISEPTICS

COMPARISON OF 2:7-DIAMINOACRIDINE, 5-AMINOACRIDINE AND PROFLAVINE

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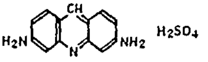
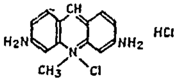
F. A. ROBINSON
M SC (TECH) MANC, F I C

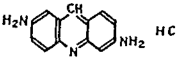
(*From the Glaxo Laboratories, Ltd, Greenford, Middlesex*)

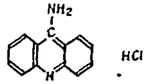
WHEN first used in the treatment of wounds, acriflavine was considered relatively non-toxic; it could be applied in bactericidal concentration without appreciable inhibitory action on leucocytes or tissue regeneration. About 1932–33, however, occasional toxic symptoms were reported, and though these seem to have been partly due to variation in methods of manufacture, Linnell and Albert and their colleagues set to work to find other aminoacridines which would be equally efficient but less harmful than acriflavine. The most promising were 2 : 7-diaminoacridine monohydrochloride (Albert and Linnell 1936, Albert, Dyer and Linnell 1937, Albert, Francis, Garrod and Linnell 1938) and 5 aminoacridine hydrochloride (Albert, Rubbo and Goldacre 1941, Albert and Ritchie 1941, Rubbo, Albert and Maxwell 1942).

2 : 7-diaminoacridine monohydrochloride had a systemic toxicity was less inhibitor to the respiration tissue, on the oth antiseptic than acr in presence of seru hydrochloride was also less toxic than acriflavine; in antibacterial activity it was about equal to proflavine and its solutions did not stain skin or fabric.


Proflavine
(2 8-Diaminoacridine sulphate)


Acriflavine


2 7-Diaminoacridine monohydrochloride


5-Aminoacridine hydrochloride

We have now reinvestigated the bacteriological and pharmacological properties of 2 : 7-diaminoacridine monohydrochloride and 5-aminoacridine hydrochloride, and the following is a summary of the results.

RESULTS OF INVESTIGATION

Toxicity.—Values of LD 50[1] (in mg per k

2 : 7-diaminoacridine monohydrochloride, 300 ; 5-aminoacridine hydrochloride, 70. The toxicity of acriflavine in solutions of pH 3 was similar to that at pH 6

Effect on blood and plasma—The solubilities of the compounds in saline, the pH of the resulting solutions, the concentrations that just failed to give a precipitate with plasma, and the concentration that just failed to produce hæmolysis of a 2% suspension of rabbit red cells are shown in table I, the values being expressed in mg. per 100 ml. The bases were included, because it had been suggested that their lower solubility and the higher pH of their solutions might make them more suitable for local application.

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[1] Average dose which will kill 50% of animals in 2–3 days

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TABLE I

—	Solubility in saline	pH at 20° C.	Plasma reaction at 20° C.	Hæmolytic effect at 20° C.
Salts				
2 : 7-Diaminoacridine monohydrochloride ..	400·0	5·8	26·0	50·0
5-Aminoacridine -hydrochloride ..	142·0	6·0	9·0	30·0
Proflavine	300·0	2·2	30·0	100·0
Acriflavine	200·0	2·0	10·0	30·0
Bases				
2 : 7-Diaminoacridine ..	0·36	..	0·06	..
5-Aminoacridine ..	0·47	..	0·25	4·7
Proflavine base.. ..	0·55	..	0·1	0·38

Tissue culture.—The effect of the compounds on fibroblasts was tested in cultures of chicken embryo heart. The effect on the motility and phagocytic activity of leucocytes was also examined. In both sets of experiments, the toxicity increased in the following order: 2 : 7-diaminoacridine monohydrochloride, 5-aminoacridine hydrochloride, proflavine, acriflavine.

Bacteriostatic and bactericidal activity.—Like previous workers, we found acriflavine the most active against gram-positive organisms, followed by proflavine. Against the gram-negative organisms, *Bact. coli* and *Ps. pyocanea* acriflavine was again the most active, but 2 : 7-diaminoacridine monohydrochloride and 5-aminoacridine hydrochloride were only slightly inferior to acriflavine and were more active than proflavine. Acriflavine was much more rapid in its action against staphylococcus than 2 : 7-diaminoacridine monohydrochloride, but slower against *Bact. coli* and proteus; compared with 5-aminoacridine hydrochloride it was more rapid against all three organisms.

A new method of assessing bactericidal potency, recently introduced by Withell (1942), consists in the measurement of LT 50—that is, the time required to reduce the number of bacteria to 50% of the original count. This method was applied by us to the acridines, but the substances were tested in serum instead of in water or saline. The averages of repeated experiments are given in table II.

TABLE II—LT 50 IN MINUTES

Substance	*Staph. aureus*			*Bact. coli*		
	Temp. : 37° C.		21°	37°		21°
	1:5000	1 : 10,000	1:5000	1:5000	1 : 10,000	1:5000
Salts						
2 : 7-Diaminoacridine monohydrochloride ..	9	9	35	4	20	15
5-Aminoacridine hydrochloride	25	40	35	6	8	25
Proflavine ..	55	95	100	4	12	20
Bases						
2 : 7-Diaminoacridine ..	85	150	>180	130	>180	>180
5-Aminoacridine	75	105	..	4	35	15
Proflavine base	55	105	100	12	12	15

It will be seen that in serum 2 : 7-diaminoacridine monohydrochloride kills *Staph. aureus* more quickly than do proflavine or 5-aminoacridine hydrochloride, and that in general the salts kill more rapidly than the bases.

In experiments on staphylococcus toxin in vitro, and on diphtheria toxin in vitro and in vivo, the acridine derivatives did not neutralise them when applied in concentrations from 1 in 500 onwards.

Animal experiments.—The effects of the acridine compounds on tissue were compared by injecting 0·2 ml. of a 0·5% suspension of each subcutaneously into the flanks rabbits. 2 : 7-Diaminoacridine monohydrochloride 5-aminoacridine hydrochloride caused local irritation limited to the area of injection; this lasted for 3–7 days, and occasionally a scab formed, which separated in a week. 5-aminoacridine base was absorbed more quickly than 2 : 7-diaminoacridine base, which sometimes formed a nodule that persisted for two or three weeks.

In the concentrations used, proflavine was more damaging than the other two compounds; the skin over the injected area became necrotic in 3–5 days and a crater-like ulcer, covered with a firmly adherent scab, persisted for 10–14 days. Proflavine solutions buffered at pH 7·0 gave similar lesions; so the effect was not due to the acidity of proflavine solutions.

In rabbits no delaying effect was observed in the healing of artificial wounds treated with gauze soaked in 0·1% solutions of 2 : 7-diaminoacridine monohydrochloride and 5-aminoacridine hydrochloride.

The effect of the powdered acridines on wound healing was also tested as follows: artificial wounds were made in rabbits and guineapigs by cauterising with an electric iron and removing the eschar. The wound on one flank of each animal was dressed on alternate days with the powdered acridine and covered with lint, whilst the wound on the other flank was dressed without antiseptic. The area of the treated wound was measured every 4 days until the control wound was healed, which generally took 20 days. Powdered proflavine, acriflavine and 5-aminoacridine hydrochloride considerably delayed the healing of the wounds, which became covered with a thick scab; proflavine was the most, and 5-aminoacridine hydrochloride the least, inhibitory. With 2 : 7-diaminoacridine monohydrochloride, on the other hand, the rate of healing was only slightly less than that of the control wounds, and only a thin pliable scab formed, which separated easily. The corresponding base was even less inhibitory to wound healing, the extent of epithelialisation being similar to that of the control wounds.

The effect of the compounds was tested in rabbits on artificial wounds infected with fresh suspensions of *Strep. hæmolyticus* and *Ps. pyocyanea*. The wounds were dusted daily with 2 : 7-diaminoacridine monohydrochloride and acriflavine and examined daily, together with control untreated wounds. The rate of healing was greater, and the granulation tissue looked healthier, in the wounds treated with the 2 : 7-compound than in those treated with acriflavine; with the latter pus formation continued longer. Consecutive observations of infected laparotomy-wounds in rabbits confirmed the superiority of 2 : 7-diaminoacridine hydrochloride over acriflavine.

Preliminary experiments in animals have shown that, on injection, 2 : 7-diaminoacridine monohydrochloride is partly excreted unchanged in the urine, and further investigations are in hand to determine whether the urinary concentration is sufficiently high for the compound to be effective as a urinary antiseptic.

SUMMARY

Both 5-aminoacridine hydrochloride and 2 : 7-diaminoacridine monohydrochloride are potent antiseptics. Although they are closely related to one another and to proflavine, there are important differences in the properties of the three compounds.

Experiments in vitro indicate that 2 : 7-diaminoacridine monohydrochloride exerts its bacteriostatic effect in a very short time; it has a relatively high solubility and its systemic and local toxicity is low.

Experiments on animals show that on injection into subcutaneous tissues 2 : 7-diaminoacridine monohydrochloride is less damaging than proflavine or acriflavine, while in powder form it interferes less with wound healing. The same is true, to a less extent, of 5-aminoacridine hydrochloride, which has the added advantage of being non-staining.

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DIFLAVINE IN WOUND THERAPY *

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SINCE C. H. Browning discovered the valuable properties of certain acridine compounds a vast amount of study has been devoted to them. For many years acriflavine has been the favourite, although various workers have shown experimentally that proflavine is *less toxic and equally bacteriostatic.* Clinically the flavine drugs have always been employed, so far as we can discover, in the form of dilute solutions. Early in 1942 we began using proflavine powder (2 8 diamino-acridine sulphate) as a wound dressing and reported our results in 80 cases (Mitchell & Buttle 1942). Having now treated over 200, we find no reason to modify our opinions

In 1936 Albert and Linnell produced a new compound 2:7-diaminoacridine monohydrochloride (hereinafter called diflavine), and later Albert, Rubbo and Goldacre (1941) discovered 5-aminoacridine hydrochloride It was said that diflavine was less toxic than either acriflavine or proflavine, and was equally bacteriostatic against many organisms (Albert et al. 1938). Stimulated by this claim we decided to test the substance clinically, and through the courtesy of Glaxo Laboratories Ltd we were provided with 160 grammes diflavine and also with 100 g. of 5 aminoacridine hydrochloride. So far we have not used the latter substance in man, because when we tested its toxicity by animal injections we found it more poisonous than either proflavine or diflavine. Amounts up to 25 mg proflavine and diflavine were injected intraperitoneally into desert rats without apparent ill effects, but 2 mg 5 aminoacridine was the most tolerated by these animals

Diflavine is a dark brownish red crystalline powder, soluble in water, glycerin, and other solvents. In concentrated solution it has a blood-red colour, and this is disadvantageous clinically, first because it may give the wound a spuriously healthy appearance, and secondly because it looks like blood when it soaks through dressings or plaster. Proflavine produces a brick red or orange coloration which has no resemblance to the colour of blood In dilute solutions (e g , 1/1000), diflavine is orange-yellow, and definitely darker than acriflavine or proflavine in corresponding dilutions

The flavines have a great affinity for the cotton products commonly employed as dressings, and it is well known that this tends to limit their efficiency since much of the drug applied in solution to a wound is wasted in the dressings In this respect an interesting point arises Both acriflavine and proflavine stain cotton and linen (e g , theatre gowns) deeply, and the stains are difficult to remove Diflavine stains these materials equally readily, but the stains are relatively easily eradicated Presumably this indicates a lesser affinity between the dye and the material, which would be a clinical advantage Naturally the use of any of these flavines in powder form largely overcomes the disadvantage of absorption by the dressings

CLINICAL OBSERVATIONS

Our stock of diflavine has enabled us to treat 47 patients Their wounds have varied in severity from septic blisters and small flesh wounds to suppurative arthritis and compound comminuted fractures The majority wer [illegible]

The diflav [illegible] Most often it was employ [illegible] cleansing of the wound with [illegible] and it was dusted or spread over the entire wound in a thin layer. Sometimes, for large raw areas, it was used in the form of a 5% solution in glycerin, to provide a non-adherent dressing The amount of the powder depended on the size of the wound, but the average was 0 5–0 75 gramme, and the maxim [illegible] was 2 0 g. Dressings were [illegible] as possible, usually every 4th [illegible] ng was used in conjunction with the closed-plaster technique. When the powder is applied the patient may complain of a smarting or burning pain which soon abates. Others feel no pain, and the 5% solution in glycerin seldom gives rise to discomfort. In one patient general toxic disturbances resulted from the use of the drug. This case is described later.

Considering the series as a whole we have gained the impression that diflavine is not as efficient as proflavine, and we have not yet seen one case in which there was a dramatic improvement, whereas in a series (admittedly four times as large) treated with proflavine at least 8 patients showed a striking change for the better after *other forms of treatment had failed* This occurred in 2 cases after succinyl sulphathiazole, and in one case after penicillin, had been given fair trials With one exception benefit was always obtained, but not the remarkably favourable responses occasionally observed after the use of proflavine and penicillin.

Healing was not delayed in any patient · indeed, as with other methods which reduce or eliminate infection, it was actually promoted The effect on healing may be studied in wounds where the complicating factor of infection is absent Thus in 6 patients with open bone or joint injuries treated at operation with prophylactic applications of diflavine and sulphanilamide all the [illegible] ctures [illegible] –0 5 g [illegible] excision of the wounds alone, if performed efficiently and sufficiently early, may in itself prevent infection, but some wounds are so large, irregular or contaminated that complete excision would entail the destruction of important anatomical structures Most surgeons agree that in such wounds the use of sulphanilamide is undoubtedly valu [illegible]

[illegible] Actually the flavines are active both against streptococci and staphylococci, but we stress [illegible] in our experience stap [illegible] by sulphanilamide, su [illegible] Most surgeons are convinced that the sulpha drugs used as local applications do not delay healing, and we are accumulating evidence that proflavine and diflavine, in the amounts indicated, also do not interfere with repair

Proflavine powder often causes a noticeable diminution in the amount of wound discharge, and sometimes this is so pronounced that the wound becomes covered with a pellicle similar to, but more pliable than, that produced by tannic acid Diflavine is less potent in drying up wound discharges, and therefore the tanning effect is less apparent, although it has been seen characteristically in a number of superficial lesions In larger wounds with profuse discharge, the exudate often becomes ropy or mucilaginous after the application of diflavine. In one case the amount of discharge increased after treatment with diflavine, an effect not yet produced by proflavine, and the local aggravation was accompanied by general toxic manifestations.

This patient had a severe compound fracture of the tibia and fibula as a result of a shell wound, with a wound 7 × 5 in. on the postero lateral side of the affected leg When he came under our care, a fortnight after wound [illegible] doses of sulphadiazine intravenously for a head injury and when his plaster was changed 10 g sulphanilamide was applied to the leg wound The discharge did not diminish at all, and the new plaster became so sodden and offensive that it was changed in a week, and a fresh one applied with a window cut out over the wound Through this opening the wound was dressed first with eusol, and then with succinyl sulphathiazole cream, without appreciable improvement.

Three weeks later (about six weeks after wounding) the plaster was changed once more, and this time the wound was covered with 2 g proflavine The discharge became noticeably less profuse and offensive, and when the plaster was removed after three weeks the wound m [illegible] 5 × 4 in [illegible] Culture [illegible] raw area was dusted with about 1 5 g diflavine. The patient complained of a burning sensation in the wound, and about twelve hours afterwards he developed a generalised morbilliform eruption, with malaise and anorexia. The wound discharge again became profuse, and watery sero-pus soaked through the plaster and ran out at both ends. When the cast was removed three days later it was found that an extensive area of skin around the wound had become completely raw. Culture of the pus still gave *B. proteus* only. The whole area was dusted with sulphanilamide and a fresh plaster applied, and thereafter he had no further trouble. He gave a history of developing skin rashes if he came in contact with cats, so at the height of the eruption he was given adrenaline 7 minims subcutaneously, but without appreciable effect. His urine and stools remained normal, he did not vomit, and he had no jaundice.

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* Based on a lecture delivered at a Pathological Congress, MEF, on March 4, 1943

BACTERIOLOGICAL CONTROL

Clinical results provide the only real criterion of the value of any agent, but corroborative evidence may be obtained from bacteriological investigations both in vivo and in vitro. The attempt to correlate clinical progress with bacteriological findings, however, is not always successful. With a puckish disregard of theoretical expectations, healing sometimes seems to proceed in inverse ratio to the apparent seriousness of the case as judged by consecutive bacteriological reports. If it were possible to test the pathogenicity of the organisms, a complete approximation between clinical and laboratory findings might be obtained, but with the standardised methods essential for routine examination anomalies and discrepancies will always occur.

We have already stated our opinion that diflavine is not as efficient as proflavine, and the results of bacteriological examinations, although not always consistent, bear this out. Of the 47 cases in which diflavine was used, bacteriological reports were obtained in 36. In 5 cases, usually because the wounds were small and there was no bone or joint involvement, no swabs were taken. In 8 cases the drug was used prophylactically as part of the treatment of wounds which subsequently healed by first intention. In the remaining 36 it was found that 12 of the wounds were infected with mixed growths of streptococci and staphylococci, 6 with streptococci only, and 4 with staphylococci only. The types (e.g. hæmolytic or non-hæmolytic) are not differentiated because clinically the flavines seem to be potent against all the ordinary strains encountered in this area. In only 2 cases did one application of diflavine lead to disappearance of streptococci or staphylococci from a wound, whereas in 22 cases with similar wound flora 8 gave negative results for these organisms after one application of proflavine. Even after three or four applications of diflavine it was possible in 7 cases to isolate these cocci from swabs, but it is unusual to find staphylococci or streptococci in a wound which has been treated three times with proflavine. Complete sterility of the wound is seldom attained with either drug, for when the cocci disappear *B. proteus* often appears, even when previous swabs did not reveal the presence of this organism. The widespread distribution of *B. proteus* in wounds in the Middle East, and the fact that lesions contaminated with this organism usually heal well, points to the conclusion that this bacillus is mainly a saprophyte. In the remaining 14 cases, 3 were infected with *B. pyocyaneus*, 5 had clostridia plus other varieties of germs, and 6 had other mixed infections such as combinations of streptococci, staphylococci, *B. coli*, *B. proteus*, and *B. subtilis*. Definite conclusions cannot be based on such small groups, but it was interesting to find that in 2 of the 3 cases infected with *B. pyocyaneus* applications of diflavine led to replacement of this organism by the ubiquitous *B. proteus*. This observation may have no importance, but the only agent we have previously found to have any effect on *B. pyocyaneus* is dilute acetic acid. Of the 5 wounds containing clostridia, only one exhibited the clinical signs of gas gangrene, and this case will be quoted.

The patient, a corporal aged 23, was blown up by a land mine in Tripolitania on Jan. 10, 1943. He sustained multiple penetrating and perforating wounds of both lower limbs, especially the right. He had a comminuted fracture of the right fibula, an incomplete fracture of the right tibia, and multiple foreign bodies in the surrounding tissues. His [illegible] were cleaned and dressed with sulphanilamide and [illegible] gauze on the day of wounding, his right leg and foot were fixed in a split plaster, and he was given 1 pint blood and 5 pints plasma. He had no other local treatment before he reached us on Jan. 14, but he had received 3 g. sulphathiazole and 8 g. 'Prontosil' by mouth.

He arrived in the evening, the last stage of his journey having been by air. Like three other seriously wounded men who arrived by the same air convoy he was exhausted after travelling for the most part of four days, and his general condition was poor. He complained of pain in the right leg, but this was relieved by cutting the bandages which had been applied around the split plaster, and he fell off to sleep soon after this was done. Next morning he still looked very ill, whereas his three companions all looked and felt better after a night's rest. He complained that his right leg was again painful, so under gas-and-oxygen the plaster was removed. Immediately it was apparent that gas gangrene was present, involving the anterior tibial and peroneal groups, and the outer parts of the calf muscles. Gas bubbled from multiple perforations over these muscles when the plaster and dressings were removed, there was the characteristic fœtid smell, and incisions revealed gangrene of the muscles and thrombosis of the anterior tibial artery and vein.

The condition had not been suspected before removing the plaster, and no warning had been given that amputation might be necessary. It was therefore decided to make free incisions, to excise the damaged muscles with their contained foreign bodies, and to trust in this plus chemotherapy to hold the condition in check until the position could be explained to the patient and permission obtained for amputation. The large wounds resulting from this operation were all dusted with 10 g. sulphathiazole and 2 g. diflavine, and the limb was fixed on Cramer wire splints. He was given 70,000 units polyvalent gas-gangrene serum, and during Jan. 15 he was also given 3 pints blood by drip, 9 g. sulphadiazine intravenously and 9 g. sulphathiazole by mouth, along with alkaline solutions intravenously and by mouth. Examination of the muscle revealed *Cl. welchii*, and swabs of the pus gave the same organism and also hæmolytic streptococci and *B. pyocyaneus*.

On Jan. 16 he felt and looked much better. His leg was not painful but was discharging profusely. That day he received 18 g. sulphathiazole by mouth and continued to drink large amounts of alkaline fluids. His blood sulphathiazole was 11 mg. per 100 c.cm., and his Hb was now 84% compared with 64% before transfusion. On Jan. 17, having obtained permission to amputate if necessary, he was again anæsthetised. It was obvious, however, that the disease had been checked, and only small remaining portions of the anterior tibial and peroneal muscles and the outer thirds of gastrocnemius and soleus required removal. Another 10 g. sulphathiazole and 2 g. diflavine were applied locally, and the dose of sulphathiazole by mouth was reduced to 9 g. On Jan. 18 he felt and looked still better than before and his blood sulphathiazole was 10 mg. per 100 c.cm. On the 19th his wounds were treated with another 2 g. diflavine, and the limb was fixed on a posterior plaster slab. Cultures of pus taken on Jan. 17, 19 and 22 gave streptococci only, and no clostridia.

His further course, which has been entirely favourable, need not be detailed, but the following figures may be given. Between Jan. 15 and 22, when chemotherapy was stopped, he received 81 g. sulphathiazole by mouth, 20 g. sulphathiazole locally, 9 g. sulphathiazine intravenously, and 6 g. diflavine locally, besides 70,000 units polyvalent gas-gangrene serum intramuscularly. In the four days before admission here he had been given 3 g. sulphathiazole and 8 g. prontosil by mouth.

Strictly speaking this was not a case of localised gas gangrene, for two whole muscle groups and part of a third were involved, and the favourable result was due to a combination of factors, of which chemotherapy and surgery were probably the most important. The man's leg has been considerably weakened, but with the aid of a foot-drop appliance it will still prove more useful than an artificial limb.

In the other 4 cases infected with organisms of the clostridia group the use of diflavine alone led to their elimination; and it has been found that proflavine is also efficient in causing the disappearance of these bacteria from wounds. In this respect the work of McIntosh and Selbie (1943) is of importance, because it shows that locally applied proflavine is more efficient than sulphanilamide or sulphathiazole in protecting mice against *Cl. welchii*.

SUMMARY

(1) Diflavine (2:7-diaminoacridine monohydrochloride) and proflavine (*2:8-diaminoacridine sulphate) are* less toxic than 5-aminoacridine hydrochloride.

(2) Diflavine powder has been used as a wound dressing in 47 cases and proflavine powder in over 200 cases. Benefit was produced in almost every case. Most of the *patients treated were battle casualties,* and the lesions

(3) The [illegible] diflavine is not quite a [illegible]

(4) Diflavine and proflavine are active in vivo against streptococci, *staphylococoi and clostridia. Diflavine is* possibly also effective against *B. pyocyaneus.*

We wish to thank Colonel H. D. F. Brand and Colonel J. S. K. Boyd, DDP, MEF, for permission to publish this paper, and Glaxo Laboratories Ltd. for providing us with diflavine and 5:aminoacridine. We are indebted to Major R. J. V. Pulvertaft for help in treatment and for bacteriological investigations, and to the staffs of an orthopædic centre and a base transfusion unit for their valued cooperation.

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SERIAL LEUCOCYTE COUNTS IN HOSPITAL NURSES NOT EXPOSED TO RADIATION

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Mottram (1931) considered that a fall in the polymorphonuclear count below 3000 per c.mm. or a fall in the lymphocyte count below 1500 per c.mm. in a person exposed to radiation was significant of overexposure. In *peace-time over many years, these figures* have been considered to give a satisfactory gauge of overexposure to radiation. At least it has been found that if X-ray workers with such low counts are sent away for 2–4 weeks holiday, the leucocyte counts almost invariably return to the normal level and remain within the *normal* range. However, since the war began, it has been noted that the leucocyte counts of a number of X-ray and radiation department personnel are below Mottram's minimum normal levels. Despite considerable holiday periods, the leucocyte counts of these persons have not shown any long-continued improvement. On the other hand, the leucopenia does not seem to be progressive. The departments concerned were thoroughly examined but no [illegible]

To examine this theory, 552 leucocyte counts (total and differential) have been carried out on 68 apparently healthy hospital nurses and sisters who were not exposed to radiation risk. The counts were all made by the same observer *between 10.30 and 11.30 AM, using the routine* technique as carried out for the three-monthly examination of X-ray department personnel in this hospital. The examinations were made at fortnightly intervals over a period varying from 2 to 8 months. The results have not varied significantly over the different months.

TABLE I—552 TOTAL LEUCOCYTE COUNTS IN HEALTHY HOSPITAL NURSES NOT EXPOSED TO RADIATION

Above 5000 (per c.mm.)	5000–4000 (per c.mm.)	4000–3000 (per c.mm.)	Below 3000 (per c.mm.)	Total
427 (77·4%)	97 (17·6%)	26 (4·7%)	2 (0·3%)	552

Table I shows the total leucocyte counts in these *nurses; 5% were below the normal minimum* total leucocyte figure of 4000 per c.mm. and 22·6% below the commonly given normal minimum figure of 5000 per c.mm. The differential leucocyte counts are given in table II. As may be seen from this table, no less than 29% of the counts in these apparently normal nurses fall below Mottram's minimum normal, and 5·3% fall very greatly below these levels. It is improbable that such

TABLE II—552 DIFFERENTIAL LEUCOCYTE COUNTS IN HEALTHY HOSPITAL NURSES NOT EXPOSED TO RADIATION

Total counts	Total abnormal differential counts	Polymorph counts		Lymphocyte counts	
		Below 3000 c.mm.	Below 2000 c.mm.	Below 1500 c.mm.	Below 1000 c.mm.
552	161 (29%)	111 (20·1%)	28 (5·1%)	45 (8·1%)	1 (0·2%)

Both polymorph and lymphocyte counts were abnormal in the same count in 24 cases (4·5%).

[illegible] found between the number of abnormal counts in nurses on night-duty as compared with the counts of those on day-duty (table III), and surprisingly [illegible]

TABLE III—LEUCOCYTE COUNTS ON DAY AND NIGHT NURSES

NIGHT			DAY		
Abnormal	Normal	Total	Abnormal	Normal	Total
53 (26·7%)	145 63·3%)	198 (100%)	106 (29·9%)	248 (70·1%)	354 (100%)

radiation. This had no lasting effect on the leucocyte level, although the data on this aspect are too scanty to be significant.

DISCUSSION

The leucocyte count of healthy adults has been studied by workers *in many countries. Published work on* variation in the total leucocyte count is reviewed by Garry and Bryan (1935) and that on the differential count by Osgood et al. (1939). From these reviews it is apparent that the changes shown in the present series of counts are significant.

The immediate importance of these low counts is in the interpretation of the results found in workers exposed to radiation. A persistently low polymorph or lymphocyte count in a radiation worker does not necessarily mean overexposure to radiation. Of course should low [illegible] count falls progressively as shown by repeated counts at weekly intervals.

The more general interest in these findings is that the leucopenia appears to be a war effect of, at present, unknown cause. As a vitamin-C lack during the war is well documented, 5 of 10 nurses who showed persistently abnormally low leucocyte counts were given 50 mg. ascorbic acid daily. There *has been no change in their* counts during the last six weeks as compared with those of the controls. It is hoped that the effect of other possible dietary deficiencies will be investigated in the future.

SUMMARY AND CONCLUSIONS

In this hospital 29% of 552 leucocyte counts in 68 apparently healthy nurses not exposed to radiation showed polymorphonuclear or lymphocyte counts below minimum normal levels (viz., below 3000 polymorphs per c.mm. or 1500 lymphocytes per c.mm.).

There was no significant difference between the figures for nurses on day-duty or on night-duty.

This fall in leucocyte count has probably become common only since the war began.

A persistently low polymorph or lymphocyte count in a radiation worker does not necessarily mean overexposure to radiation. In such a case the department should be examined for possible stray radiation, but the person should not be debarred from work unless the polymorph or lymphocyte counts fall progressively as shown by repeated counts at weekly intervals.

My thanks are due to the nurses and sisters who volunteered for these blood-counts.

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ELECTROLYTIC ACTION IN DENTAL APPLIANCES

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WHENEVER dissimilar substances are in contact there is a difference of electrical potential between them, but this is only of significance in the case of metals. When dissimilar metals are arranged in a circuit, the voltages due to the series of contacts normally neutralise each other. This neutralisation may be upset in various ways—for instance, when one junction is at a higher temperature than another. There is thus the possibility that a current will be produced if one junction of an appliance is within the body and another outside. Far greater voltages are generated when the dissimilar substances are a metal and an electrolyte which react chemically, in which case the chemical reaction releases electrical energy. This is the principle on which the normal cell or battery works. Certain alloys readily disintegrate in an electrolyte if the metals are incompletely intermingled or far removed in the table of electromotive force of metals; it follows that plating will give rise to electrolytic action if at any point the plating is lost. There are many possibilities for this type of action in the mouth but normally they have little influence.

Venables (1938) has investigated the electrolytic action of the metals used in plating fractures. This led to the employment of vitallium, an alloy of cobalt, chromium and molybdenum, which was found to be electrically inert in the tissues, causing no tissue reaction and no bone necrosis. Unfortunately it is not readily applicable to maxillo-facial surgery. Lain and Caughron (1936) have also discussed the galvanic action of dental restorations within the mouth. They describe disintegration of electro-positive metals and discoloration of electronegative metals.

Electrolytic action has been observed at this hospital in three cases with severe results.

EXTRA-ORAL FIXATION

Crossed pin fixation of mandibular fractures has been developed considerably in this unit, and the method employed has been described by Mowlem and others (1941). Ordinary Kirschner wire was originally employed for the pins and in order to reduce the weight of the appliance aluminium alloy was used in its construction (fig. 1). The method has been used successfully in 27 cases. Its application to the treatment of cases requiring bone-grafts enabled us to dispense with the stability previously provided by a solid block of bone and to employ bone chips instead. In these cases the anterior fragment was fixed in position by cast silver splints cemented to the teeth, and the anterior pins were therefore eliminated, the bar from the pin fixation in the posterior fragment being brought directly to the splint (fig. 2). The first 3 cases treated by this modification developed ulceration of the soft tissues and necrosis of the bone at the site of insertion of the pins. The bone graft was completely successful in each case.

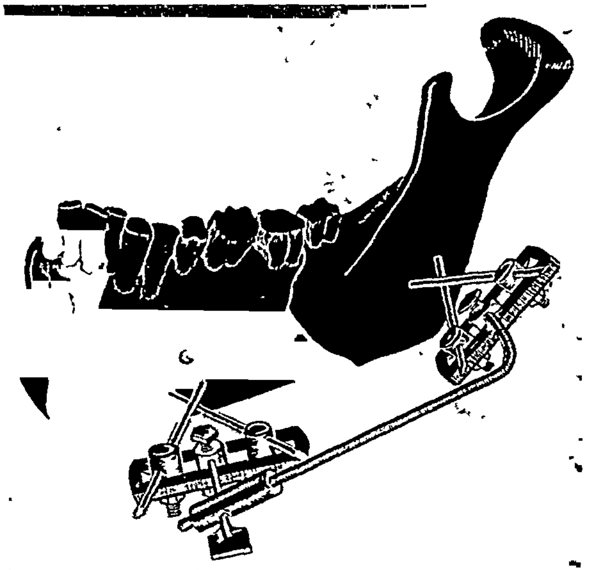

Fig. 1—Standard type of pin fixation.

CASE 1.—Aged 53. Sept. 20, 1940: fracture at right angle of mandible; *gross infection*; very little *treatment*. Nov. 11, 1941: admitted to Hill End Hospital; non-union, bone defect being ¾ in. Feb. 2, 1942: bone-graft operation. Feb. 28: discharge around pins. March 4: crateriform ulcer extending ⅜ in. around pins; culture gave good growth of *Staph. albus* (coagulase negative), seven colonies of hæmolytic *Staph. aureus* (coagulase positive). March 17: pins came out and showed marked corrosion. March 18: all fixation discarded. March 22: parotid fistula developed. June 27: parotid fistula closed, but purulent discharge continued. Sept. 4: sequestrectomy of portion of ramus of mandible, including both pin-holes. Jan. 11, 1943: multiple small sequestra removed. March 1: no inflammation and sinus almost closed. May 26: sinus closed.

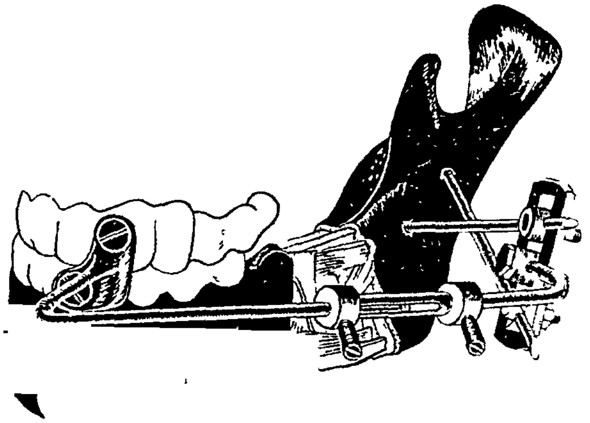

Fig. 2—Adaptation of method in which pins are attached by a bar to intra-oral splint.

CASE 2.—Aged 19. Nov. 18, 1941: admitted to Hill End with fractured left angle of mandible. March 16, 1942: bone-graft operation. March 18: some discharge from site of insertion of pins. March 24: ulcer forming symmetrically round pins; gram film showed many pus cells, irregular fragments of yellow material, and no bacteria whatever; culture, aerobic and anaerobic, sterile. ("Absolute freedom from bacteria in an open lesion of this kind strongly suggests antibacterial action by a metallic salt." Prof. Garrod.) March 30: pins getting loose. April 10: pins removed and showed corrosion. June 11: bone-graft firm; sinus in pin region discharging. July 17: sequestrectomy. Sept. 16: further sequestrectomy including pin-holes. Dec. 14: sinus still discharging, curetted, no sequestra found. March 25, 1943: still slight discharge from sinus. May 1: sinus closed.

CASE 3.—Aged 26. April, 1940: gunshot wound of left mandible and multiple injuries. Aug. 7, 1941: admitted to Hill End with non-union of mandible, bone defect 1½ in. March 23, 1942: bone-graft operation. March 31: ulcer developing round pins. April 4: culture gave profuse and pure growth of coagulase-positive staphylococcus. April 8: well-marked ulceration round pins. April 13: pins removed; considerable corrosion. April 27: sinus explored; ramus found denuded of periosteum; wound packed. June 6: parotid fistula developed. June 24: parotid fistula closed. Sept. 25: sequestrum, including both pin-holes, removed (fig. 3). Nov. 13: sinus closed.

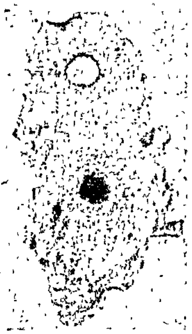

Fig. 3—Sequestrum after removal, showing pin-holes

The first case developed ulceration of the soft tissues at the site of insertion of the pins, 16 days after operation. The bacteriological report appeared to be sufficient explanation. Before the pins were removed from case 1, case 2 was operated on, and case 3 was grafted before the ulcer developed in case 2. Within 8 days case 2 also developed an ulcer of a similar type, and cultures taken from this ulcer proved negative under both aerobic and anaerobic conditions. The similarity in appearance of the ulcers in 2 cases in which the same type of apparatus had been used, and the sterile cultures from the second case, suggested that the ulceration might in fact be due to electrical action. The fact that the pins on removal from case 1 were grossly corroded also supported this view. A recording galvanometer was therefore employed to see if any difference in potential could be detected between the two ends of the apparatus. In vitro, with a piece of splint metal and a Kirschner pin as electrodes, suspended in Ringer's solution as the electrolyte, a reading of between 100 and 500 millivolts was obtained. In case 2, by taking one lead from the pins and the other from the splint while in position on the patient, a reading of 40–50

out ulcer symmetrically placed around the pins, with yellow, sloughy margin, purulent discharge and surrounding swelling and hyperæmia. More pain was experienced than is usual in pin fixation. The ulcer, like all lesions due to electrical action, proved very indolent. Subsequent radiograms showed complete survival of the graft, but localised necrosis around the pin site. Sequestra were removed [illegible] of the ramus including b[illegible] case a portion of pin, whic[illegible] in situ. The total healing time was 10 months in one case, and over a year in the other two. On account of the site of the fracture the pins were inserted high up on the ramus of the mandible and radical surgery was therefore contra-indicated.

The Kirschner wire used was of chromium-plated steel. In the method of pin fixation previously referred to, using two sets of pins (fig. 1), the series of metals are symmetrically placed and the contact voltages are neutralised. In this development of the method a silver splint and copper oxide cement within the mouth form one

lyte, was probably sufficient to liberate iron and chromium ions from the pins into the tissues. Both iron and chromium ions are known to be cell poisons, and the sequestra when tested for iron by the ferricyanide method gave a strongly positive reaction, particularly round the pin-holes, whereas controls did not.

Two changes have been made to obviate further ulceration. A non-conducting junction made of acrylic resin has replaced a metallic junction in the connecting bar, while 'Staybrite' stainless steel pins have replaced the plated pins. With these modifications 7 further cases have been treated without ulceration or necrosis.

INTRA-ORAL FIXATION

Some degree of injury is often noticed opposite projecting points and soldered junctions on dental splints. In some cases the ulceration is well-marked, there is yellow discoloration and slow healing. In these cases local battery action is probably responsible. Such ulceration has be[illegible]s, and was more severe wh[illegible] and subsequently drilled [illegible]s exposing a metallic junction. When a plated steel screw was similarly treated, a small ulcer persisted for 3 weeks, while the head of the screw almost disintegrated. Since stainless steel screws have been substituted, no ulcers from this cause have been observed. Ulceration is also seen opposite soldered junctions on the appliances. This is more noticeable with a new cadmium solder than with hard silver solder, although this difference does not outweigh certain other advantages.

Minor degrees of ulceration from these causes tend to heal after 4–8 days. At the same time the metal assumes a dull appearance. The change may be due to loss of the more electro-positive metal from the surface layers, and possibly also to a protective coating of mouth debris, tobacco stain, &c. Investigations are being continued in an effort to avoid this action, partly by the employment of a suitable protective film and partly by eliminating the causative metals.

SUMMARY

In three cases of fractured mandible treated by bone-grafting and extra-oral fixation, electrolytic action developed between the copper-silver dental splint and the chromium plated steel pins, causing ulceration, bone necrosis and very delayed healing. The graft survived in each case but a sequestrum formed ½–1 in. around the pin-holes. Electrolytic action may also account for ulceration around screws, projecting points and soldered junctions on intra-oral splints. Preventive measures include the use of non-conductive plastic materials in connecting bars and stainless steel pins and screws.

We wish to thank Mr. Rainsford Mowlem, who performed the bone-grafting operations, for his cooperation in these investigations; Miss D. E. Orpen for the drawings; and the other members of the unit who have assisted in many ways.

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COCAINE AS AN AID TO INTUBATION IN INFANTS

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ANÆSTHETIST (WAR-TIME) TO THE HOSPITAL FOR SICK CHILDREN, GREAT ORMOND STREET; ANÆSTHETIST, EMS, HEMEL HEMPSTEAD BASE HOSPITAL

IN 1940 Macintosh[1] suggested the application of a minute quantity of 10% cocaine directly to the larynx before intubation for endotracheal anæsthesia in infants. He reported its use in 8 cases under one year of age, in all of which intubation was made easier; there were no untoward effects. At this base hospital the procedure has been tried on 51 consecutive cases of hare-lip and cleft-palate, all between the ages of six weeks and three years using 5% instead of 10% cocaine.

Anæsthesia is induced with either vinyl ether or ethyl chloride, followed by 'Vinesthene' mixture (vinyl ether 25%, ether 75%) on an open mask. When the first plane third stage of anæsthesia is reached and the jaw is slack, the mouth is opened by the thumb and fingers of the left hand,

[illegible] ing at the head of the table in the usual way. The cocaine is thus confined to the vital part, the glottic entrance and the posterior surface of the epiglottis supplied by the superior laryngeal nerve,[2] or at least there is no extensive application such as would occur if a spray was used. The mask is now reapplied and anæsthesia is maintained for two or three minutes to allow the cocaine to act before laryngoscopy and intubation are undertaken through the mouth.

No ill effects of any kind have been encountered.

Unless anæsthesia is deep, infants are notoriously liable to spasm when the larynx is exposed, and in my experi-

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1. Macintosh, R. R. *Practitioner,* 1940, 145, 280.
2. Macintosh, R. R. *Lancet,* 1943, i, 205.

ence the younger the infant the more obstinate the spasm if it is allowed to develop. By using a minute amount of cocaine intubation can be undertaken at a lighter stage of anæsthesia without encountering this difficulty. In one case a slight technical hitch had resulted in the anæsthesia lightening to such an extent that the child's limbs were actually moving, yet the larynx was seen to be wide open and the tube was passed without any difficulty. Without the cocaine the larynx would have been in spasm (and remained so) at the first touch of the tube, and its passage would have been impossible.

Without cocainisation spasm is often engendered by the removal of the tube at the close of the operation. Hare-lip and cleft-plate operations take on an average 20–40 minutes; the cocaine remains effective for this period.

In fat children and those with big tongues it may be difficult to avoid losing some of the cocaine on the back of the tongue as the larynx is approached; a curved tongue-depressor has been found helpful in such cases.

To sum up, this small manœuvre facilitates the passage of an endotracheal tube by direct vision at a lighter level of anæsthesia than would otherwise be possible, and thus makes deep general anæsthesia unnecessary for the procedure. It obviates spasm both on passing and on removing the tube, and in 51 cases has proved harmless.

Reviews of Books

A Medical Bibliography

Fielding H. Garrison, revised with additions and annotations by Leslie T. Morton, librarian, St. Thomas's Hospital Medical School. (Grafton. Pp. 412. £2 10*s.*)

While that inspired scribe Fielding Garrison was assistant at the Army Medical Library in Washington, he dropped into the Index Catalogue a list of *Texts illustrating the History of Medicine* which, with characteristic modesty, he called a "historical exhibit" but was soon recognised as a classic. He used the list himself as scaffolding to his *Introduction to the History of Medicine* and later revised it, again as part of a serial publication. But discerning readers came to use it as a vade mecum to their study of medical thought throughout the ages. An English librarian has had the happy idea of bringing Garrison's "exhibit" up to date and making it accessible in a handy volume of its own. Mr. Morton has discarded 360 entries, mostly not concerned with medicine, and added 1680 of his own making a total of 5506, indexed by number under authors and subjects. Under each subject the selected works are arranged in chronological order, revealing the growth and trend of medical thought, and Mr. Morton has added a line or two (sometimes only a few chosen words) to help the reader where the title is foreign or not informative. He suggests that the compilation may serve as a starting-point for something better, and while this may be true its present form will certainly be the starting-point for many readers in an intelligent study of medical history. Others will find the immediate clue to that name that had so tiresomely dropped out of mind.

Die Thrombozyten des menschlichen Blutes

A. Fonio, professor of surgery in the University of Berne; J. Schwendener, assistant. (Huber. Pp. 130. Sw. fr. 9.60.)

This brochure describes the morphology of platelets seen under dark-ground illumination, and 112 fine photomicrographs provide a pictorial accompaniment to the text. Unlike the erythrocyte and leucocyte, the platelet is continually changing its shape so that within a matter of minutes a complete metamorphosis can occur. The photographer has caught these quick change artists of the blood-stream in various guises, with granules migrating towards the edge of the cytoplasm, with forking of the pseudopodia, drumstick-like feet and thrasher limbs. In following their movements from the active to the siesta phase one cannot but notice a striking resemblance to the microglial cell. The later sections of the book record the behaviour of the thrombocyte in the process of clotting. Figs. 11 and 12 are from Wolpers and Ruska's study with the electron microscope. Under a magnification of 11,000 (undreamt of by Donné who almost a hundred years ago was the first to describe these "globulins" of the blood) even the bulb-like endings of the pseudopodia appear to possess a structure. Those who mean to study thrombocytic choreography will find full technical details in the early section of this fascinating little book.

Psychology of Fascism

Peter Nathan, mb lond, mrcp. (Faber. Pp. 158. 8*s.* 6*d*)

This intelligent little book exhibits a confident assertiveness which would lead one to suppose the author quite young if it were not that some of it may be explained by his belief in psycho-analysis. Sweeping phrases like: "as the religious account of life has had the bottom knocked out of it, . . ." "Wagner is one of the biggest factors in the causation of this war," "Fascism is the expression in both sexes of the wish 'I want to be a man'," are instances of this weakness. In the main, however, his argument is well sustained and plausible, provided that the common psycho-analytical tenets are accepted, and are considered applicable to the behaviour of nations or large groups. Even if unwilling to accept these provisos, the reader will find Dr. Nathan a stimulating casuist.

Vertebrate Photoreceptors

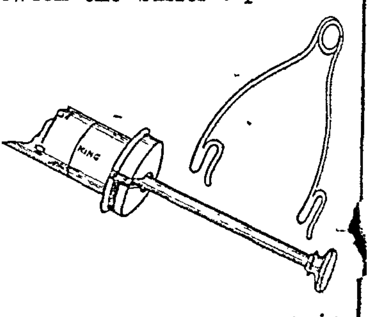
Samuel R. Detwiler, professor of anatomy, College of Physicians and Surgeons, Columbia University. (Macmillan. Pp. 184. $4.00)

This is one of the well-known series of *Experimental Biology* monographs and it maintains the good traditions of the series. It is a book of wide scope in its range and with a wealth of accurate detail, described so clearly that all essentials are included in the compass of 18[illegible] pages. Its breadth of view reveals the parallelisms in the structural details of the eyes of the different vertebrate classes; and it sounds a warning note about the assumptions of Woollard and the generalisations of Elliot Smith on the correlated evolution of the eye and brain among the mammals. The bibliography is useful but omits the work of Kelvin O'Day, a study of which would have ruled out the statements that: "double cones occur in all retinas except in mammals" and "oil droplets . . . are lacking in mammals." O'Day has shown conclusively that both are present in monotremes and marsupials, as others had done before him. But these little things which can readily be put right in subsequent editions do not detract from the value of a book that is wholly admirable in scope and presentation.

New Inventions

ASPIRATING SPRING FOR RECORD SYRINGE

The small spring here illustrated has proved a great help in giving intravenous injections to patients with difficult veins. The spring, which was inspired by a fisherman's gag, fits between the barrel cap and the plunger knob of an ordinary 10 or 20 c.cm. Record syringe.



The syringe is filled in the ordinary way, the needle introduced just through the skin and the spring then slipped into position. The vein can be steadied with the left thumb while the syringe is pushed forward with the right hand. The entry of the needle into the lumen of the vein is immediately apparent by blood being sucked into the syringe by the tension of the spring. The spring is then slipped off with the left hand without disturbing the position of the syringe and the injection made in the ordinary way.

The spring has been made for me by Messrs. A. Charles King, Ltd., London.

H. Marcus Bird, m r c s, d a.

THE LANCET

LONDON: SATURDAY, SEPTEMBER 4, 1943

FORWARDS

(WITH RESERVATIONS)

EMERGING from their conferences with the Ministry of Health, the Representative Committee invite the medical profession to take its stand on eleven principles governing the reorganisation of medical practice Many of these principles are unexceptionable, but for our part we do not accept them as the profession's last word on its immediate future The effect of the statement is to discourage doctors from collaborating with the Government in setting up a comprehensive medical service for everybody as soon as possible · instead the RC propose improvement of the National Health Insurance service and its extension to the dependants of insured persons and to voluntary subscribers Such an extension has been well described as an extraordinarily elaborate mechanism for excluding about 10% of the population However admirable it may have seemed five years ago, the proposal is now obsolete The public, we believe, will demand that the same medical advantages shall be available to every member of the community, and this is the first requisite for securing the highest quality of service

All will agree with the RC that the most important aids to health are not medical services but good social and environmental conditions, security against fear and want, high nutritional standards, sound educational facilities, and opportunities for exercise and leisure But it is fantastic to argue, as some do, that the Government is not entitled to embark on medical reorganisation until it has provided new homes, new factories, new schools, and a new peace, with full employment and good food for everybody A government's duty is to make the improvements within its power, and one of the reforms that could almost certainly be made soon after this war is to see that the benefits of diagnostic and remedial medicine —which are not negligible—are distributed more fairly and widely and effectively to the public If the will is there, this thing can be done without waiting for other instalments of the millennium To those who point to the existing shortage of practitioners and say that reorganisation will make it worse, we reply that the shortage is an additional reason for using medical man-power economically—first by making sure that new posts are established in places where they are particularly needed, secondly by abolishing wasteful overlapping, and thirdly by relieving doctors of every function that can be performed as well or better by an almoner, a dispenser or a secretary We hope therefore that the Government will not waver in its determination to introduce, as soon as it can, BEVERIDGE'S "comprehensive national health service' which so far as may be possible "will ensure that for every citizen there is available whatever medical treatment he requires, in whatever form he requires it" Like the RC, however, we set a high value on professional autonomy. we want the doctor to have enough influence to make him professionally happy as well as efficient; indeed the two states are interdependent And we do not yet know how far the Government's proposals will be satisfactory in this respect.

In previous articles we have emphasised the distinction between hospital care (provided by the specialist) and personal care (provided by the family doctor) No fundamental objections are likely to be raised if the Government decides that doctors supplying hospital care are to receive salaries from regional health authorities, and such a plan should be generally acceptable if suitable safeguards are given On the other hand there is less prospect of early agreement on the employment of the doctors who supply personal care, and it might be a mistake to try to force practitioners into a salaried service before they are persuaded of its merits The RC says firmly that the family doctor must be employed by the patient, to whom his responsibility will lie, and that the ideal doctor-patient relationship can continue to exist only if the remuneration of doctors 'is based on the number of persons or families selecting a doctor, or related to the items of service rendered" This view lacks detachment: we think that, given guarantees of professional autonomy, a salaried doctor might be in a position to offer the best type of personal help to his patient But this has yet to be proved, and proof can come only from experience The vexed question of health centres is also one that can best be settled by trial and error The association of general practitioners in such centres seems to most of us a natural and necessary development if skill and equipment are to be pooled and clerical services made available, but it is doubtful, to say the least, whether doctors can work congenially together in such centres unless they are paid by salary Competition between them for fees is not a promising basis of cooperation

A comprehensive medical service should in our opinion be established without unnecessary delay, but we suggest that the family doctor, who provides the element of personal care, should—at any rate for a time—remain free to practise either from a health centre or from his own surgery, as he prefers Every member of the community must be insured, and each should be allowed to choose as personal adviser any practitioner belonging to the service, whether he is working at a centre or not A uniform fee would be paid to the doctor for each patient on his list, or to the centre for each patient on its members' lists, but it would not be permissible for any doctor within the service to accept a private fee, since its acceptance would mean that money could buy of him something better than he was offering to his ordinary patients. Under this arrangement general practitioners would have a chance within the next few years to determine the relative advantages and disadvantages of work in isolation and at group centres of various kinds—both publicly and privately controlled The public, on their side, would be able to decide whether they liked the centre better than the surgery

PSYCHIATRIC TRAINING

In the postwar developments of medicine, the requirements for specialist diplomas will no doubt be made stricter and more uniform. One of the most widely held of these diplomas, that in psychological medicine, could in an extreme case be obtained by a man six months after he had attained his medical qualification, provided that he had spent that six months in full-time work in almost any public mental hospital, attended certain clinics during it, and could satisfy the examiners. It has been widely held that more than this should be the minimum requirement, and that the standard of the examination should be raised. A great deal turns on the amount of clinical experience that should be insisted on. The British Medical Association committee on mental health maintained in 1941 that "at least three years postgraduate psychiatric training is necessary to qualify a practitioner to claim specialist status." A more recent committee,[1] under the auspices of the International General Medical Society for Psychotherapy and with Sir Walter Langdon-Brown as chairman, has likewise urged that the standard of postgraduate training and of the existing diplomas in psychological medicine needs raising. A majority of this committee favoured a general diploma, covering all branches of the subject, and a more advanced "honours diploma" to be taken in one of six possible branches by those already possessing the general diploma, after an additional two years specialised study and practice in the chosen branch. The six branches are psychoses, psychoneuroses, mental defect, child psychology and psychiatry, forensic psychiatry, and industrial psychology and psychiatry. Since the general diploma could, in this proposal, be taken only after two years special study and practice, including a year's full-time appointment in a mental hospital and regular attendance at a psychiatric outpatient clinic, there is clearly a considerable rise here in the clinical requirements. The wisdom of having two diplomas, one for all-round competence and the other attesting more advanced and more specialised capacity within this specialty, is open to question, since it might split the subject up, parcelling out topics that are interwoven. Thus the child psychiatrist must consider constantly the adult problems presented by the child's parents, if he is to remedy some of the troubles arising out of parental mismanagement; he must be fully acquainted with the pathology and treatment of psychoneuroses; he will often be involved in forensic questions since juvenile delinquency is his affair, and in industrial psychology and psychiatry since in early adolescence questions of vocational placement and industrial conditions will often come under his notice; and he must possess advanced knowledge of mental defect. There is, one might say, more of a case for a general qualification in the specialty than for a special one; and this applies as much to an "honours" as to an "ordinary" diploma. In practice the committee's proposal might lead the abler men, after they had taken the ordinary DPM, to concentrate on one branch; consequently, employing authorities—such as health or education committees—would either have to create a variety of psychiatric appointments in the one locality, or (if they wanted their mental hospital staff to conduct also outpatient clinics for children and adults) would have to employ doctors who had no advanced diploma, or who had been concentrating on one of these branches only. The clause permitting a subsidiary subject would not materially lessen this difficulty.

The committee's report advocates, besides clinical work, special training courses, lasting six months to two years, as a requirement for the honours diploma in all branches (except psychoses, for which whole-time work for two years or more in an approved mental hospital would suffice). The special courses would be in psychotherapy, theory and practice of mental testing, or criminology and delinquency. It seems possible that men who work full-time in mental hospitals will in future have at least as great an interest and share in conducting clinics for neuroses and child-guidance as any other group of psychiatrists, and that we cannot take for granted the same rigid compartments as have hitherto kept several psychiatric groups out of sympathy with each other. What psychiatry needs is perhaps not more specialising within the specialty, but less. The Langdon-Brown committee's report mentions that two members considered that "special concentration of energy on organic disorders and on the techniques of organic medicine was a positive disadvantage to the student of medical psychology." Such views are more readily fostered when the ways of the exponents of the "organic" and the "functional" approach diverge early after they have once acquired a common diploma. The report emphasises that a sufficiently high standard for the diploma demands that there should "be some form of understanding between the various examining bodies, or all others must agree to withdraw their diplomas in favour of one of their number." The latter is, on the face of it, impracticable, but the former requirement is imperative—that one or two examining bodies should be able to grant the diploma to candidates who could not meet the more exacting demands of most universities and colleges would be lamentable. Probably the General Medical Council or the Royal Colleges would have to be responsible for controlling this. The same considerations might apply to the vexed question of the amount of neurology which should be linked with psychiatry in the training and examination of specialists in this field; the members of the committee were unable to reach agreement about it.

The chief difficulty in planning postgraduate psychiatric work and diplomas is to be found in the present inadequate psychiatric training of the British medical student; there is no reason why psychiatry should not deserve as prominent a place in our medical schools as in those of the United States. Another difficulty lies in the general uncertainty about the pattern of postgraduate education. It is undesirable that there should be any pronounced divergence between the strictness of the requirements for a higher qualification in psychiatry and for one in other medical disciplines. To anyone who contemplates the discrepancies between our various postgraduate diplomas, it is difficult not to admire the way they now do these things in the USA. The methods of the American Board of Neurology and Psychiatry, lately described by **Ebaugh** and **Rymer**[2] of Colorado, have much to recommend them, and the large number of their diplomates suggests that severe clinical requirements do not deter candidates.

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[1] Report of the Langdon-Brown Committee on Post-graduate Training in Psychological Medicine, 1943.

LABORATORY TESTS FOR TRICHINIASIS

The value of specific skin and precipitin tests for the diagnosis of trichiniasis has been in doubt ever since **Bachmann** introduced the present type of antigen in 1928. Their sensitiveness and specificity have varied widely in different hands. In 1941 **McNaught**, **Beard** and **Myers**[3] reported favourably on their usefulness in acute trichiniasis, and claimed that they are as reliable as any other recognised clinical or laboratory test. But the fact that tests may remain positive[4] for years after an acute infection has introduced a complication in the interpretation of a positive test in a possible acute infection. There are undoubtedly many unrecognised cases of infestation—for example, 21 unsuspected cases were observed in routine histological examinations of material removed at operation at the Mayo Clinic[5]—and post-mortem examination of diaphragms has shown a startlingly high incidence of quiescent trichiniasis in various parts of the world, reaching as high as 33% in the United States. Yet there have been few large-scale attempts to correlate autopsy or operation findings with skin-tests. **Queen**[6] made the attempt in a small series in 1931, and a more adequate survey, covering 116 people, was undertaken by **Schapiro**, **Crosby** and **Sickler**[7] in 1938. Of 27 patients with positive skin-tests they found larvæ at autopsy in 24, while of 89 with negative skin-tests larvæ were found in only 2.

Gould[8] does not confirm these excellent results. His is by far the most extensive survey yet made, and must outweigh most of the previous work. He has studied routine autopsy material from 1231 persons of all ages, done skin-tests on 3010 persons who did not come to autopsy, and compared autopsy material and skin-tests in 388 patients who had been skin-tested before death. The skin-tests were carried out with three different antigens, prepared at different laboratories, but the results with the three did not differ materially. The post-mortem incidence of infestation, using 50 g. portions of muscle, showed a continued rise with advancing age—in the age-group 20–29 years the infestation-rate was 3·6% (deaths under 20 years were too few to be of statistical value), while in the 80–89 group the rate was nearly 33%. The incidence of positive skin reactions was almost exactly reversed—in the age-group 10–19 there was a positive skin reaction in 9·5%, and subsequent decades showed on the whole a downward trend, falling to 3·1% in the 80–89 group. The discrepancy is clearest in the 388 cases where both skin-test and autopsy were performed. In 89 persons of all ages in whom trichinæ were found at autopsy, skin-tests had been positive in 10·1%, while in the remaining 299 no trichinæ were found but skin-tests were positive in 5·4%. The specificity of the antigens used was confirmed by skin and precipitin tests on 103 inmates of a home for aged orthodox Jews (mean age 77): one antigen gave no prompt positive results at all, the other two only 2% and 1%.

It seems from all these results that the reliability of skin-tests in the diagnosis of old trichiniasis remains uncertain, and even in acute trichiniasis most workers have not claimed such specificity or sensitiveness as **McNaught** and his colleagues. **Beeson**[9] has pointed out that in an acute illness a negative skin reaction, changing later to a positive, is a strong diagnostic sign; similarly, a rapid rise in the eosinophil count is much more significant than a single observation of eosinophilia. **Melcher** and **Campbell**[10] have lately isolated a serologically specific polysaccharide from trichinæ which gave [illegible] infected [illegible] antisera from other worm infections. Positive skin-tests were obtained, using 0·5–1·0 mg. of material. A pure antigen of this type may prove trustworthy in the diagnosis of acute infections, but no improvement in the antigen is likely to enable old infections to be detected with anything like certainty outside the post-mortem room.

Annotations

TRIGEMINAL NEURALGIA TREATED WITH NICOTINIC ACID

A well-known neurosurgeon once said that when he injected the Gasserian ganglion there were two terrified people, one at each end of the needle. In any but the most experienced hands this is a harassing and uncertain procedure, and even when it is successful is likely to need repetition in a year or two. The surgical treatment of trigeminal neuralgia, though offering a permanent cure, is not completely devoid of risk, and both methods give relief at the cost of the discomfort produced by anæsthesia. Any more physiological method of treatment is therefore welcome. Adams and Robinson[11] of Leeds reported in these columns that the paroxysms of pain could be relieved by nicotinic acid, and this has now been confirmed by Furtado and Chicorro.[12] These Lisbon workers were led to use the vitamin by the observation that the pain of tic douloureux is often accompanied by vasomotor changes in the trigeminal area. The vasodilator effect of nicotinic acid is now well established; Goldsmith and Cordill[13] think it is due to a local effect on the arterioles in the skin, an effect which is not produced by nicotinamide. Furtado and [illegible] ents with nicotinic acid with [illegible] id 4 complete cures. They [illegible] injection of 100–200 mg. and in some cases give the nicotinic acid by mouth as well. In successful cases a few injections were followed by complete relief of pain lasting for months, and when an injection was given during an actual paroxysm the relief of pain was immediate. It is perhaps too early to speak of cure as a result of this treatment since no patient had been observed for more than a few months, but even if experience shows that it needs to be repeated at intervals it is such a simple remedy that it will be welcomed by patients and doctors alike.

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[2] Ebaugh, F. G. and Rymer, C. A. Psychiatry in Medical Education, London. 1943. Reviewed in the *Lancet* of July 31, p. 130.

[3] McNaught, J. B., Beard, R. R. and Myers, J. O. *Amer. J. clin. Path.* 1941, 11, 195.

[4] Theiler, H., Augustine, D. L. and Spink, W. W. *Parasitology*, 1935, 27, 345.

[5] Wyrens, R. G., Tillisch, J. H. and Magath, T. B. *J. Amer. med. Ass.* 1941, 117, 428.

[6] Queen, F. B. *J. Parasitol.* 1931, 18, 128.

[7] Schapiro, M. M., Crosby, B. L. and Sickler, M. M. *J. Lab. clin. Med.* 1938, 23, 681.

[8] Gould, S. E. *Amer. J. Hyg.* 1943, 37, 1.

[9] Beeson, P. B. *Lancet*, 1941, ii, 67.

[10] Melcher, L. R. and Campbell, D. M. *Science*, 1942, 96, 431.

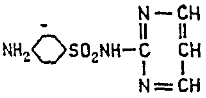
[11] Adams, W. E. and Robinson, W. *Lancet*, 1941, ii, 555.

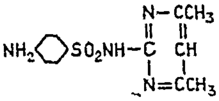
[12] Furtado, D. and Chicorro, V. *Rev. clín. Españ., Madrid*, 1942, 5, 416.

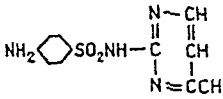
[13] Goldsmith, G. A. and Cordill, S. *Amer. J. med. Sci.* 1943, 205, 204.

VARIATIONS ON THE SULPHADIAZINE THEME

Last year Manchester workers[1] reported a highly successful clinical trial of ‘Sulphamethazine’ (later called ‘Sulphamezathine’),[2] a dimethyl derivative of sulphadiazine. Their fatality-rate in adult pneumonia was the same as with sulphapyridine, but toxic symptoms were negligible. It was hoped that this compound would prove as effective and as little liable to produce gastric upsets as sulphadiazine, while its greater solubility would make renal blockage less likely. Since then there have been equally satisfactory results in pneumonia in children,[3] with no renal complications; in a further mixed series [4] there was one case of urinary suppression and one of hæmaturia, both transitory, among 77 patients treated. Now another methyl derivative of sulphadiazine has been brought forward in America [5] under the name of sulphamerizine, which is sulpha-monomethyldiazine. Compared with sulphadiazine, sulphamerizine is more quickly absorbed but more slowly excreted by the kidney. Consequently a given dose produces a much higher concentration in the blood, and maintains it longer. Thus when 3·5 g. is given by mouth to an eleven-stone man, the average blood concentration at 2 hours is 8 mg. per 100 c.cm., at 4 hours 10 mg., at 24 hours still 6 mg., and at 48 hours over 3·5 mg. per 100 c.cm. When the same dose of sulphadiazine is given, the average blood concentration at 2 hours is 3·0 mg. per 100 c.cm., at 4 hours 5 mg. (this being the peak), and at 24 hours only 2 mg. per 100 c.cm. Since an effective blood concentration is reached more quickly with sulphamerizine than with sulphadiazine, there is less need in acutely ill patients to start the treatment with an intravenous injection of the sodium salt in order to avoid delay while the compound is absorbed from the intestine.


Sulphadiazine


‘Sulphamezathine’


Sulphamerizine

The chief difference between sulphamerizine and sulphamezathine is that the latter is more soluble, with sulphadiazine a bad third. Both the new drugs are rapidly absorbed from the intestine, so that the initial blood concentration is about equal with each; but sulphamezathine is excreted more rapidly, so that the blood level reached is less well sustained and more frequent dosage is required. In the urine, the two new drugs and their acetyl derivatives are more soluble than sulphadiazine and acetyl sulphadiazine respectively, especially if the urine is kept slightly alkaline. Clinical reports and experiments with monkeys however have shown that deposition of crystals can occur, and it will be well to take the same precautions against renal obstruction as with the other sulphonamides—maintain a large fluid intake, keep the urine alkaline and be on the look-out for any diminution in the volume of urine excreted during the 24 hours. Since sulphamerizine is retained in the body to a greater extent than sulphadiazine, it is somewhat more toxic, dose for dose, but when the higher blood concentration is taken into account there is no significant difference between them. An average blood concentration of 27 mg. per 100 c.cm. can be tolerated by monkeys for long periods (provided that sufficient fluid is given to prevent renal blockage), but one of 32 mg. per 100 c.cm.—much higher than that needed for clinical purposes—causes damage to the kidneys, depression of the activity of the bone-marrow, and possibly degeneration of the liver; peripheral neuritis or damage to the nervous system should be rare, or unknown, judging by animal experiment.

As regards its therapeutic powers, sulphamerizine appears to be as active as sulphadiazine (in equal blood concentrations) in experimental infections of mice. Reports on its therapeutic action for human infections have not yet been published, although the compound has been administered to many patients. The toxic symptoms seen in man appear to be much the same as those of the other sulphonamides, judging by the experience of Clark, Flippin and Murphy,[6] who have treated 200 patients. Gross hæmaturia was reported in only 1 case out of those receiving routine treatment (3 g. initial dose followed by 1 g. every 6–8 hours); nausea and vomiting occurred in 4%, dermatitis of the usual type in 3%, drug fever in 2·5% and leucopenia in 2% (one patient having mild agranulocytosis and thrombocytopenia). No nervous lesions developed in any of the patients, but 2 suffered from transient mental disorientation. Clearly the new drugs must be given with as much care as any of the other sulphonamides, but if this is done toxic results should be rare. Altogether sulphamerizine and its near relation sulphamezathine seem at the moment to be the most promising sulphonamides for general clinical application.

CANNABIS INDICA

The resin of the flowering hemp has guarded its pharmacological mystery for two thousand years since the earliest records of its use for medicinal purposes, and every attempt to isolate or assay its active principle has failed. The biological effects of its extracts and tinctures vary greatly in quality and degree, and this persistent fickleness has so discouraged their uses that they are not even mentioned in the latest edition of the British Pharmacopœia or its Addenda. But the drug possesses several outstanding properties which might well be valuable in therapeutics, if reliable standardised concentrates could be devised. It is a hypnotic with substantial analgesic powers, and does not leave any aftermath of constipation or heavy-headed hangover. Patients do not acquire much tolerance to it even after many doses, and although a drug of addiction it does not commonly lead to physical deterioration or exact any penalty when withdrawn. It is used by millions who chew, smoke or swallow it and in recent decades it has obtained a following in America where the treasury department confiscated 195 tons of illicit material in 1935. Large crops of *Cannabis sativa* are cultivated for the oil and rope industries and as it grows wild by the roadside state control over its unlawful use can scarcely be exercised effectively. Its usual non-medicinal presentation in America is the “reefer,” a short thick cigarette consisting of a mixture of tobacco and Indian hemp in a brown paper wrapping. One or two such cigarettes are sufficient to produce the desired syndrome, with its compulsive euphoria, sense of elation and happy superiority, sometimes followed by drowsiness and sleep. The active principle is not an alkaloid, but a lipoid-soluble non-nitrogenous substance embodied in a resin (cannabinone). On careful distillation the resin yields a thick oily composite fraction, cannabinol, with powerful narcotic properties, studied by S. Fraenkel in 1903. The chemical researches of Adams [7] and Todd,[8] and the pharmacological work of Loewe and Modell [9] have shown that the original resin contains, inter alia, two

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1. Macartney, D. W., Luxton, R. W., Smith, G. S., Ramsay, W. A. and Goldman, J. *Lancet*, 1942, i, 639.
2. The chemical name is commonly abbreviated to sulphadimethyl pyrimidine. A suitable non-proprietary name is under consideration.
3. Jennings, P. A. and Patterson, W. H. *Lancet*, 1942, ii, 308.
4. Peters, B. A. and Easby, M. L. *Brit. med. J.* Aug. 21, 1943, p. 230.
5. Welch, A. D., Mattis, P. A., Latven, A. R., Benson, W. M. and Shiels, E. H. *J. Pharmacol.* 1943, 77, 357; Murphy, F. D., Clark, J. K. and Flippin, H. F. *Amer. J. med. Sci.* 1943, **205**, 717.
6. *Amer. J. med. Sci.* 1943, **205**, 846.
7. Adams, R. *Science* 1940, **92**, 115.
8. Todd, A. R. *Endeavour*, 1943, **2**, 69.
9. Loewe, S. and Modell, W. *J. Pharmacol.* 1941, **72**, 27.

substances which after esterification can be separated in pure crystalline forms. Their structional formulæ have been discerned and they have been named cannabinol and cannabidiol, a nomenclature which is confusing because both compounds are pharmacologically inert and the term cannabinol had already been applied to Fraenkel's potent distillate. With the aid of catalysts, cannabidiol can be converted into related bodies, tetrahydrocannabinols, which biologically are highly active. Cannabinol can be synthesised, a member of the tetrahydrocannabinol series appearing as an intermediate link in the sequence of reactions. The group contains many homologues and isomers both chemical and optical the study of which promises to yield useful new drugs The active principle itself, presumably a tetrahydrocannabinol, still eludes the chemist and has not yet been isolated from its inactive associates, cannabinol, cannabidiol, terpenes and other bodies. Nevertheless fractions have been obtained which are more powerful than any of the synthetic tetrahydrocannabinols so far examined, and analytically the effective constituents appear to belong to the same series. Isolation should not be long delayed. Identification and synthesis will inevitably follow in customary sequence and supply us with one more pharmacologically active principle for experimental and clinical survey.

CONTINUOUS CAUDAL ANÆSTHESIA IN OBSTETRICS

THE exact nature of the sensations experienced during labour may be in doubt, but it is certain that a large majority of women wish to have them relieved Yet obstetricians, psychologists and patients are coming to agree on the desirability of the patient being conscious during delivery, hence the increasing interest in spinal and caudal anæsthesia Caudal, or sacral epidural, anæsthesia, an extradural injection of local anæsthetic drug through the sacral hiatus, is not new in obstetrics As a single dose injection, however, its usefulness is limited by its short period of effectiveness. Hingson and Edwards,[1] applying the principles which Lemmon and Paschal[2] introduced in spinal anæsthesia, turned it into a continuous method, by which anæsthesia can be made to last throughout the second stage of labour—the longest time in their series being 26½ hours Several clinics in America have put the method on trial, and their enthusiasm has infected the daily press Single dose caudal anæsthesia has been widely used for many years in the surgery of the perineum and pelvis The occasional difficulty in inserting the needle, coupled with the comparatively high failure rate even in expert hands, have limited its use, and have made it largely give way to low spinal anæsthesia To the difficulties of the "single shot" method have now been added the necessity of keeping a needle in situ for maybe 24 hours, and this in a parturient woman, and in a site in which infection is difficult to eliminate. Thus the method, while very effective when performed by those skilled in obstetric practice and in caudal puncture, holds much hazard for the novice Siever and Mousel[3] note the frequent cessation of progress of labour till the membranes are ruptured, while 70% of their primiparæ required forceps. One case in 300 developed infection of the epidural space, while 3 patients collapsed and required resuscitation with adrenaline Then there are the ever-present [illegible] the needle and of giving a [illegible] a series of 39 cases Block and [illegible] hich the injection was mad- [illegible] lly. This woman stopped [illegible] her spinal anæsthesia lasted for 6 hours, but she recovered after strenuous resuscitative measures Like others, they have been troubled with broken needles. These complications, with the primary technical difficulties of inserting the needle must put the novice on his guard, but need not discredit what promises to become a great advance in obstetric analgesia under suitable conditions

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1 Hingson, R and Edwards, W *Anesth & Analges* 1942, 21, 301
2 Lemmon W T and Paschal, G W jun *Surg. Gynec Obstet* 1942, 74 948
3 Siever, J. M and Mousel, L H *J Amer med Ass* 1943, 122, 424
4 Block, N and Rochberg, S *Amer J Obstet Gynec* 1943 45, 645

HEART OF THE RECRUIT

Of the posers facing medical boards, none is more frequent or more difficult to solve than the detection of early mitral stenosis In the average recruit hypertension is unlikely unless it is renal in origin, and the detection of nephritis with hypertension is seldom difficult, [illegible] is relatively rare at this age; [illegible] is only occasionally a real prol [illegible] cause of heart disease in this age group, and only the well established case is easily recognised. In a group of 835 recruits referred by medical boards, Crighton Bramwell[1] found 157 in whom a "duplicated second heart sound" was heard at the apex; in none of them could an early diastolic murmur be heard nor could a presystolic murmur be elicited by exercise This duplication was much commoner in the younger age groups, the incidence for the under-twenties being 43%, compared with 10% for the over twenties and 19% for the whole group. There was no significant difference in the blood pressure or pulse rate in those with a duplicated second sound, compared with the entire group, and only a few of the electrocardiograms showed right axis deviation. On the other hand, cardioscopy demonstrated a more prominent pulmonary arc than usual in the men with a duplicated second sound The duplicated second sound was usually associated with an apical systolic murmur or an impure first sound Most of the men seemed physically fit, and Bramwell classified 70% as fit for grade I, of the remaining 46 cases, 22 were lads of 18 or 19 whose physical development was poor for their age Bramwell seems to be referring throughout his paper to the normal third heart sound and not a reduplicated or, as some prefer to call it, a split second sound This is unfortunate from the point of view of accuracy of nomenclature Mitral stenosis may produce either reduplication (or splitting) of the second heart sound or accentuation of the third sound, the former being due to asynchronous closure of the aortic and pulmonary valves, and the latter to an accentuation of the normal process whereby the third heart sound is presumed to be caused The careful differentiation of these two "sounds" is no mere academic caprice, and, while the differentiation of the reduplicated part of the second sound from the third sound by timing may be difficult in the presence of a tachycardia, in the case of heart rates around 75 per minute it is quite possible, and in most early cases of mitral stenosis it is these relatively normal heart rates with which we are dealing. What Bramwell's findings seem to come to is this In a fair number of healthy young adults the third heart sound can be heard, especially if auscultation is carried out with the subject lying on his left side after exercise This finding is physiological and in no way indicative of mitral stenosis By drawing attention to the relative frequency of this phenomenon Bramwell has contributed another guide to the clinician in the correct diagnosis of early heart disease.

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1 Bramwell, C *Brit Heart J.* 1943, 5 24

TEXTBOOKS FOR PRISONERS.—Those who have hunted their shelves for copies of the textbooks (listed in our issue of Aug 28, p. 272) needed in prisoner of war camps abroad have done their share in preventing barbed wire disease In thanking them for their interest and generosity the Red Cross and St John Organisations ask us to remind them that copies must be completely unmarked; notes in the margin unfortunately disqualify books for a passport to enemy territory.

Special Articles

THE MAN AND HIS JOB

FROM WAR TO PEACE

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AMONG the scientific developments sponsored by the Fighting Services during this war, few have wider significance for the future than their large-scale application of the industrial psychologist's techniques for the selection of personnel. The Royal Navy, the Army and the Royal Air Force have placed many hundreds of thousands of men in their war-time employments by methods which, until three years ago, were adopted only by a few progressive industrial and commercial organisations. Nor have the Women's Services been neglectful of these new "sorting" procedures; the ATS scheme is a model of its kind. Searching follow-up investigations have clearly shown that the techniques used have already justified themselves by reducing training wastage. Moreover, these methods are generally popular among those to whom they are applied.

The Service psychologists, working often in close cooperation with the Service psychiatrists, have accumulated experience which will soon be ripe for the consideration of our planners of social security. How could this experience be utilised? As indicated in a leading article in THE LANCET of April 3, 1943 (p. 433), it might be used to some extent in returning Service men and women to civil life. The machinery built up for their allocation within the Services could, perhaps, be reversed. For four groups, particularly, advice should be available—prisoners of war; the disabled; those who had no prewar occupation; and those whose prewar occupations were incommensurate with their talents.

War-time methods of selection could clearly be applied as soon as demobilisation starts by employers of labour, and by organisations, not directly under Government control, charged with selecting trainees for the professions and trades. Many years have passed since Mr. Seebohm Rowntree, himself one of the pioneers in this field, pointed out that employers who spared no pains to ensure supplies of sound raw materials and machinery often took no trouble at all in selecting their employees, and therefore by neglect blunted their good intentions. His viewpoint has only recently become common, and even now is not widely enough appreciated; when more can be told about the work of the Service psychologists and psychiatrists, it will almost certainly receive general approval. A great increase in the number of large firms employing personnel-selection officers can safely be predicted; smaller concerns will perhaps tend, as they did before the war, to make occasional use of a visiting expert, or of some centrally-placed body of experts, especially in the selection of men and women for their more responsible posts. In three directions particularly considerable progress will almost certainly take place—in the selection of high executives, of trainees for technical and clerical occupations, and of applicants suitable only for unskilled work.

THE MATCHING PROCESS

It must not be thought that these developments would necessarily involve an orgy of psychological testing. Nor must it be imagined that they would often result in the unjust labelling of applicants for employment or training. On the contrary, they would lead in civil life, as they have in the Services, to more comprehensive and fairer appraisal than is customarily found at present. Tests, and especially intelligence tests and tests of mechanical aptitude, will certainly be widely adopted where they are deemed appropriate, but they will be regarded—as the industrial psychologist has always regarded them—as providing only part of the information required. For certain very high-grade types of occupation practical "exercises" of the kind worked out by the War Office selection boards for officers might usefully be adopted. But con- ble reliance will be placed on the employment interview, which—in an improved form—will continue to be the core of the whole procedure.

The adequate fulfilment of this programme in any peace-time organisation will, of course, depend on the thoroughness with which the occupations available are studied. It is no good assessing the roundness of the pegs unless one can also assess the shape of the holes. On this rock the "experienced judge of men" often founders; unless he knows both the talents and temperaments of his candidates and the talents and temperaments required by the occupations under review, he cannot perform the matching process on which his judgment of their compatibility must be based. The National Institute of Industrial Psychology has provided a useful key to "job-analysis" which has been adopted by the Royal Navy and the Army. In addition to obviously necessary information about the nature of the occupation studied, the type and availability of the opportunities for learning and following it, the qualifications obtainable in it, and the prospects it offers, the personnel-selection officer should have at his finger-tips the answers to these six questions.

(*a*) Does it demand any special physical capacities, or the absence of any particular defects or disabilities?

(*b*) What preliminary educational qualifications or previous occupational experience does it require?

(*c*) For what range of intelligence is it suitable?

(*d*) Does it call for the possession of any special aptitudes—for example, for understanding mechanical things, for figure-work, for drawing, for doing neat-fingered jobs?

(*e*) Does it suit people whose interests are in general serious or superficial, or are particularly in people, in books, *in construction, in physical activity*?

(*f*) Does it require any special qualities of "disposition"—above-average persistence in study, a flair for managing others, attentiveness to detail, freedom from extreme views?

These six questions provide a sufficient basis for th study of all occupations; and incidentally they indicat clearly the limited place the industrial psychologis gives to his tests, which rarely go beyond the scope o (*b*), (*c*) and (*d*).

GUIDANCE FOR SCHOOL-LEAVERS

An extremely important way in which the experienc of the Service psychologists could be used is in th development of a satisfactory scheme of vocationa guidance for boys and girls at school. The details o any plan eventually adopted would be largely determined by the solutions found for important administrative problems now under discussion. The Government's plan for education does not cover the whole field. I there to be a continuation of the present system, starte experimentally twenty years ago, whereby advice o choice of employment for school-leavers may be provide officially in one area by the Ministry of Labour and i a neighbouring area by the local education authorit (LEA)? Or is the Ministry of Labour to take the jo over everywhere, on the grounds that uniformity i desirable, that some LEAs are too small to exercise th function adequately, and that others lack breadth o vision when questions arise concerning the transfer o juvenile labour *from one area to another*? Or are th LEAs to be reorganised, and their responsibilities fo the welfare of adolescents extended, in such a fashio that they will all be able to undertake the task? I there likely to be obligatory national service for adolescents? On the answers to such questions as these, th industrial psychologist's contribution to the future o vocational guidance will depend.

But certain general technical points can safely b made, on the basis of both prewar and war-time experience. In the first place, the process of job-analysi will have to be applied, in a standard fashion and o a very substantial scale, to civilian occupations; an their requirements alter with disconcerting rapidity Clearly, this is a task with which the Ministry of Labou must be closely *concerned*, whether or *not* it assume the sole responsibility for vocational guidance of boy and girls of school-leaving age. Next, steps must be taken to see that young people and their parents are provided with authoritative information about these requirements and about the opportunities offered by the occupations suitable for their consideration. Th matter, too, concerns the Ministry of Labour, as the main possessor of the information; but it concerns also the LEAs, who are responsible for the early training of the children for whose benefit the information is to be used. It is not enough that relevant information should be presented during the interview at which advice is given by the employment officer; it must be available beforehand. The means adopted for distributing it will depend partly on the age and capacity of the children concerned; but, for the older children at least, there must be books, pamphlets, periodicals, well-prepared visits to places of employment and training, films in which the emphasis is on the worker's function rather than on the equipment he uses and the goods he produces, group discussions (some of them, possibly, of the Brains Trust type), individual discussions, and well-edited talks from both mature and youthful representatives of various occupations and from accredited speakers on occupations in general. Some of these propaganda media have been exploited successfully in recent years by the Ministry of Labour, by private employment agencies, by LEAs and by teachers interested in vocational guidance, but it cannot be claimed that existing techniques are adequate. Clearly, whoever undertakes their further development must work mainly *in* schools If teachers make themselves responsible for sharing the task with the employment officer, they must see that they do not encourage children to form ambitions which, in the view of the Ministry of Labour, are impossible to realise

Arrangements must be made to give all school-children at appropriate stages—two would probably be sufficient —fu [illegible] resu [illegible] the [illegible] diffic [illegible] findings that the value of evidence obtainable from paper-and-pencil group tests is out of all proportion to the trouble involved. They can profitably be employed not only in vocational guidance but also in solving the educational problems which tend to arise at a relatively early stage, when decisions have to be made about the kind of schooling required by a child or about the speed at which he should be taught Whether this testing is controlled by the LEAs or by the Ministry of Labour, it should clearly be done at the school rather than the employment office. There will of course be need for close cooperation with child guidance clinics

There is an urgent need for extension of the scheme—already in operation in many schools—whereby cumulative reports of progress are kept for use when decisions about a child's future have to be made But care must be taken in their design and completion Many existing report forms are of limited value, because they have [illegible] purposes—of the level of proficiency reached, from year to year, in certain school subjects Nor are they always completed expertly. The best method for a school to adopt is for one suitably trained member of the staff to undertake the collection and recording of data obtained in short discussions with other teachers This procedure saves time and helps to maintain uniformity in the standards applied to the children Information about work, games, hobbies and disposition, collected annually in this way, at least during the last four years of a child's school career, supplemented by a medical report embodying observations on particularly suitable or unsuitable types of occupation, would be extremely valuable to a Ministry of Labour or LEA employment officer

These proposals assume that in future vocational guidance will be regarded as an extended process It is clearly unsatisfactory that advice should be available only at the close of one brief interview, given at the end of a child's school career, particularly as the opinions expressed may determine what the child will do during the rest of his life. There are decisions to be made all along the educational and occupational line. Is this boy to be given some kind of postelementary education? If so, what kind? Is this one to sit a school certificate examination next year or the year after? Is that one fit for a higher certificate course? If so, in what subjects? Educational questions such as these cannot be separated from more obviously occupational questions Nor should questions cease to be asked or answered immediately the child is entered for a certain type of employment. His progress between the ages of 10 and 25 is usually along a road which has a substantial number of forks and cross-roads And part of the art of vocational guidance consists in deciding when is the last possible moment for an irrevocable choice of route to be made.

* * *

The plans outlined here would have to be developed with care if they were to stand a reasonable chance of success In the past, the progress of applied psychology has often been endangered by enthusiasts—mostly non-psychologists—who have failed to recognise its limitations. Particular discretion would have to be exercised in the recruitment, selection and training of the men and women needed to operate these schemes Many of the people required, including some of the most suitable, would not be professional psychologists at all, a certain [illegible] be reminded constantly [illegible] of their work Possibly [illegible] ...on of personnel advisers would have to be considered Such a profession, if it included not only industrial psychologists and psychiatrists but also Ministry of Labour officials, employment officers of LEAs, personnel selection officers from industry and school careers advisers, might lead to advances in a field whose exploration has barely begun Indeed, the foundation of an appropriate examining institution, comparable with the engineering institutions, and taking in its stride problems of guidance, selection and training, might be a useful means of conserving and nurturing the experience so notably acquired by the Fighting Services during the present war.

MEDICINE AND THE LAW

Dispute of Consent to Operation

SURGEONS certainly will not complain of the commonsense decision of the Northampton county court judge in Lee *v* Mitchell, a case in which the plaintiff sued for £78 15*s* for professional services rendered in performing the operation of prostatectomy. The case, reported in the *Solicitors' Journal* of Aug 7, shows the great importance of the patient's consent being given in writing beforehand, as well as the great variety of defences elicited (or [illegible] is made [illegible] the fee in November, 1942, [illegible] the nature of the operation had been made In 1943, when the defence was delivered to the writ, the patient's consent to the operation and the propriety of the amount of the fee were disputed for the first time

The facts, as stated in the *Solicitors' Journal*, were as follows The patient signed, before the second part of the operation, the printed form commonly used in the Northampton General Hospital—"I consent to an operation the general nature of which has been explained to me I also consent to any variation or extension which may appear necessary during the course of the operation" The surgeon had expected to operate with a special instrument without difficulty, as, however, the patient had a stricture, a more extended operation became necessary The defendant contended that he underwent the operation solely on the understanding that no knife would be used, and no blood-letting would occur, and the operation would be over in twenty minutes Instead, he said, a major operation was performed; for two hours he was in acute agony on the operating table, as the result of what had been done he suffered from a weakness of the bowels. He said he could not remember having signed the form It was argued on his behalf—though, on the assumption that he knowingly signed it, the argument seems irrelevant—that the form of consent was too wide to be valid, it would, for instance, enable a tonsillectomy to be made the occasion of a mastoid operation. It was further argued that it was not enough for the surgeon to prove that the operation was for the defendant's benefit; the patient should have been given the opportunity of considering whether he would undergo the major operation when the minor one was found inadequate. The fee was more appropriate to London than to the provinces.

The county court judge disposed of this series of defences. The operation had obviously succeeded. The defendant had given a valid consent by signing the form. It was impossible for the patient to contend that he should be allowed to recover from the anæsthetic and should then decide the future course of the operation. This was the surgeon's responsibility. The Northampton case, in fact, takes us back to Beatty *v.* Cullingworth where there was a dispute about the necessary extent of the operation. Miss Beatty consented to the removal of the right ovary which was diseased, but on entering the theatre told the surgeon "if you find both ovaries diseased, you must remove neither." He replied "You must really leave that to me; I know your wishes; you may be sure I shall not remove anything that I can help." She made no reply. The surgeon found the right ovary badly diseased and removed it; finding an inflamed cyst in the left ovary also, he removed it when treatment by puncture and dissection was ineffective. The patient sued the surgeon for damages, but the jury stopped the case after hearing his evidence. Mr. Justice Hawkins told the jury that a surgeon, not being expressly forbidden to operate, acts humanely if he does everything in his power to remove the mischief. Miss Beatty had suggested a condition—namely, that, if he thought the operation absolutely necessary, he nevertheless should not proceed to perform it on finding that there was a little more disease than he had supposed. Would any surgeon, asked the judge, undertake an operation fettered by such a condition? In Cull *v.* Royal Surrey County Hospital (*Lancet*, 1932, i, 1377) the defendant hospital was held by the injury to have been negligent when an instruction sent by letter from the medical attendant to the hospital, conveying a pregnant woman's refusal to undergo hysterectomy, was ignored. The letter was never seen by the surgeon and the uterus was removed. In the recent case at Northampton the judge expressed himself as satisfied that the surgeon had acted according to recognised medical practice. Judgment was given for the plaintiff with costs.

Hospital Nurse awarded Compensation for Tuberculosis

Hospital authorities are well aware of their liability under the Workmen's Compensation Act in respect of "accidents" to nurses. In Barnes *v.* Royal Northern Hospital, decided in the Clerkenwell county court earlier this summer, there was the somewhat novel feature that the "accident arising out of and in the course of the employment" was tuberculosis. Miss Barnes was undoubtedly in perfect health when she first took up work as nurse in April, 1939, at the Royal Chest Hospital, City Road. The first of a series of X-ray photographs of her chest, taken in the ordinary routine, indicated no sign of the disease. She had a slight cough in the following October. In May, 1940, her cough was persistent and she saw blood in her sputum. In February, 1941, when another nurse was found to be suffering from tuberculosis, the radiogram of Nurse Barnes for the first time showed that she too was attacked by pulmonary tuberculosis in a comparatively advanced stage. She was at once put to bed and was nursed there; she has been totally incapacitated ever since. The respondent hospital unsuccessfully contended in the county court that the illness was not an accident. The judge, adopting a military phraseology appropriate to the times, accepted or paraphrased the medical evidence as follows. The nurse was in an atmosphere laden with tubercle bacilli. We are all exposed to the breathing of germs of various kinds every day. Some of these are counter-attacked in our system by antibodies and destroyed. The survivors either remain dormant or, retaining their virulence, begin their assault on the fortress. Without reinforcements they might be wiped out. The constant inhalation of an infected air reinforces them and causes a concentrated attack on a part of the structure of the lung. A breach is made. Further reinforcements arrive and the disease spreads. If so, said the judge, the assault of the germs began in the hospital and succeeded on one particular day, though the exact date could not be fixed with certainty. He held that the onset of the disease was about May, 1940, though this was not known to anybody till the radiogram disclosed tuberculosis in February, 1941.

In Dover Navigation Co. *v.* Craig (1940) a seaman, serving on a ship in a West African port, especially exposed to the risk of infection from disease-bearing bacteria, contracted yellow fever and died. The House of Lords held his death to be due to an "accident arising out of and in the course of his employment"; compensation was therefore awarded to the widow. Lord Maugham observed that the risk was common to all mankind, but this fact did not prove that the accident was not connected with the employment. Death or injury from the forces of nature—e.g., lightning and earthquake—can conceivably arise out of the employment. Certainly not every illness or disease from which a workman suffers is an accident arising out of his employment. "But," he added "if it can be shown that the workman was specially exposed by reason of his employment to the risk of infection by disease-bearing bacteria, I can see no difficulty in coming to the conclusion that illness or disease so caused is due to an accident arising out of his employment." Lord Maugham thought this view agreed with the decision in the New Zealand case of Brooker *v.* Thomas Borthwick & Sons (in 1933) where a severe earthquake, resulting in the collapse of a building, caused debris to fall upon workers at premises where they were employed. Citing and applying Lord Maugham's opinion, the Clerkenwell County Court judge held Nurse Barnes entitled to recover compensation.

A technical objection taken by the hospital was that the action was not begun, and notice of the "accident" was not given, within the period prescribed by the statute. The court, however, considered that the evidence of the radiogram periodically available to the hospital authorities provided sufficient notice. The hospital authorities knew, better than the nurses, the significance of the photographs. It was their agent who informed her of her "injury" when her illness was diagnosed and she was put to bed. She was kept for some eight months at her place of employment; the fact that during this period she received her salary might induce the belief that there was no need for her to take any step. "Apart from that," said the judge, "I am prepared to find, and I do find, that the failure to make the claim within six months was occasioned by reasonable cause within section 14 (1) (*d*) of the Act."

Medico-legal Aspect of Trichiniasis

A Canadian woman developed trichiniasis through eating sausages while they were being cooked; her husband, who ate only the fully cooked sausages, escaped (*Canad. med. Ass. J.* 1943, 48, 533). She brought an action against both the seller and maker of the sausages. The action was dismissed with costs, briefly on the grounds that there is no way for the sausage maker to be sure that his meat is free from parasites, and also that even if infested there ought to be no danger if the meat is properly cooked. The story recalls one of the cases described by Davis and Allott (*Lancet*, 1941, ii, 396), but so far no such actions have been brought in this country; no doubt similar findings would hold.

HEATING, LIGHTING AND VENTILATION.—Five lectures for industrial medical officers will be held at the medical school of the University of Birmingham from Sept. 20 to 24 at 4 P.M. The lecturers are Mr. T. Bedford, D SC, and Mr. H. C. Weston, FIES, members of the staff of the Medical Research Council. Further information may be had from the secretary of the university, Edmund Street, Birmingham.

SCIENTIFIC TREATMENT OF DELINQUENCY.—Twelve lectures on delinquency will be given at the institute 17, Manchester Street, London, W.1, beginning on Oct. 2 at 2.30 P.M. Miss D. E. Chaplin will deal with intelligence and its relation to delinquency, Dr. Alex. Baldie with alcoholism, Dr. W. Hoffer with some advances of psycho-analysis in its application to delinquency, and Dr. Melitta Schmideberg with emotional factors in delinquency.

Last March the institute set up a library for the use of members and a twenty-two paged index of authors has now been issued while a subject catalogue is being prepared. Further particulars may be had from the secretary.

In England Now

A Running Commentary by Peripatetic Correspondents

I LIKED your provocative note on the proper place for children under the age of 2 (July 3, p. 21). It just isn't true that all small children will thrive in a day nursery. In the process of freeing himself from his mother the young child undergoes a far more significant weaning process than he does in learning to use a teaspoon. The physical ability to learn by progressive stages and the emotional readiness to make use of this knowledge are interwoven, and it is rather stupid to suppose that because the child can stand on his own two feet he is really doing so emotionally. It is at first sight an odd contradiction that the more fully and tenderly a child is loved the more ready he is to turn outward in his social development—as if it needed a full experience of security in one relationship to enable him to go on to make others. Even an ignorant or inept mother will love her child and with very limited means will succeed in giving him this security. Even if she goes too far in protection, "softening" or "spoiling" the child, it seems as if this is easier to outgrow than the clinging which results from lack of love. The child impersonally reared in a Home (as opposed to a home) often combines in himself naïveté and unwillingness to take responsibility with a craving for affection which nothing will satisfy.

If this sense of independence is best acquired by being brought up by your own personal mother clearly the [illegible] e, the poor [illegible] rseries is to [illegible] able to give children the sense of security; nor is she there at the same time or on the same day, or for months on end; nor can she give undivided attention to more than a few children at a time. The small child who is impersonally washed and fed, however skilfully, by a succession of women, sometimes with a need to hurry, cannot at best do more than submit himself to these ministrations, equally submissively and impersonally, or at worst protest with violence and develop the negativistic reaction which is his only line of defence. If his reaction is of the first kind he tends to withdraw into a solitary fantasy life; if the second he is called "difficult" or bad tempered.

Then there are children unable to cope with the day nursery on account of infections, intercurrent illness and minor disturbances, and the inevitable 'bad day" associated with teething, or the sort of mild shock reaction which sometimes follows a fright. But if the mother is in industry and can't be spared, the child goes to the nursery whether he's fit or not—to become a focus of ill health or irritation among the others. Perhaps most of these difficulties can be overcome by good premises and good staffing. If there are enough rooms for isolation without loneliness, if there are quiet rooms and noisy roo [illegible] active and a [illegible] large enough [illegible] tion to the sa [illegible] can continue to give him her personal care, evening and morning and at week ends, then the child may be the gainer. But let us face the facts honestly: are these conditions really there? It is in many ways like the evacuation problem; the good results are brilliant, but the bad results are horrid. Day nurseries are at present a war emergency measure. With time, money and personnel available as in peace-time, they would be used only for children suited to them, and staffed adequately by those with a vocation for the work.

* * *

I suppose some day we shall be as familiar with penicillin and its friends as we now are with sulphonamides. But so far there has been no family name for these antibacterial substances that you can get out of some bacteria themselves, such as *Bacillus brevis* (gramicidin, tyrocidine) and *Pseudomonas pyocyanea* (pyocyanase), as well as from a large assortment of moulds besides *Penicillium notatum*. Vonkennel (*Klin. Wschr.* 1943, 22, 321) mentions aspergillus, a number of fusaria, cephalosporia and microspora, and members of the genera epidermophyton and achorion. He suggests calling the whole boiling "MYCOINS"; any objections?

* * *

Professor Adrian, in what was probably an aside to his recent Sharpey-Schafer lecture (*Lancet*, July 10, p. 33), remarks that we tend to be acutely conscious of, and interested in, faces. I would not like to subscribe to the sensory explanation given to this interest by Professor Adrian, but of its extent there can be no doubt. In its most subtle form, however, it seems to have unconscious rather than conscious ramifications. If one opens the *Tatler* at any page showing photographs of engaged or newly married couples, in a considerable proportion of the couples there is a striking resemblance in the facial features of the happy pair. This is shown particularly in the form of the mouth, cheeks and general contour of the face, but often the faces are so much alike that the blissful pair could have been identical twins. The lover is of course acutely conscious of, and distinctly interested in, the face of his mistress, and indeed primarily one is perhaps in love with a face. Engaged couples are, I fancy, unaware of their resemblance, yet there cannot be much doubt that this to some extent explains the immediate attraction of one person for another. The resemblances in photographs of engaged couples can be put to a simple laboratory test, using the method of paired comparisons: for n couples, the separate members of which are put into one sample, the chance of taking up the photograph of one person and spotting its mate is 1 in $(n-1)$. In tests made with photographs taken from the *Tatler* I have found it easy to exceed this chance significantly, for values of n up to 20 pairs. I must add, for the sake of completeness, that a dog and its master, and even a horse and its mistress, are sometimes said to resemble one another in facial features, a matter about which I have an open mind.

* * *

I am going to make a bit out of the gullibility of the public quickly, before Sir Wilson Jameson and the Radio Doctor have de-gulled [illegible] oxygen is essential for life [illegible] very ill, and the nurses g [illegible] already dead. The airman's BLB mask has become as familiar as the cricketer's pads were in peace-time. You cannot have too much of a good thing so why not give it more often? I am going to find a good recipe for some wholesome buns, and before these are put in the [illegible] 10 c cm. of pure [illegible] use. When the [illegible] plant to include [illegible] a needle for each bun fixed in the tray so that two thousand buns can be inflated at the same time. I shall market these as *Doctor So-and So's Oxygenated Buns*, and advertise them like mad. With the proceeds—less my fee and expenses, of course—I may build a research institute. To the sneers of my less wealthy colleagues I shall reply that my buns are at least as effective as much of the oxygen therapy that I see in the wards.

* * *

Grandma was right after all. And not only about sucking eggs. How we used to laugh when she told us not to sit on cold stones, and when she made grandpa wear his cholera belt! But we three, sceptical and up to date as we are, have had our illusions rudely shattered in a spasmodically painful and gripping fashion. On a recent luxury cruise at His Majesty's expense, from Berkeley Square to *Hush*, we enjoyed rushing from our overheated mess to the moon drenched upper deck, to dry our sweat sodden shirts in the beautiful balmy breeze. When next we met, at 05.00—much earlier than expected, and ere the rising of the sun—we were candidates for one seat, and in this three-cornered contest precedence was taken in order of seniority, even of the Services. A colonic catastrophe had overtaken us, and [illegible] behind us with the proverbial bit of lead piping. *Chill* had seized us in her icy grasp, and our vitals, not our victuals, were violently involved. Grandma knew a thing or two!

Public Health

ASCORBIC ACID LEVEL
OF HERTFORDSHIRE SCHOOL-CHILDREN

G. V. JAMES, MSC, PH D LOND, F I C
MAJOR, R A S C

With a note on some children in the same area by

J. R. MARRACK, M D CAMB
PROFESSOR OF CHEMICAL PATHOLOGY IN THE UNIVERSITY OF LONDON

THE following is an account of some work undertaken on behalf of the Herts County education and public health authorities to determine the level of nutrition with regard to ascorbic acid of school-children in their area.

Two centres were selected: one a garden city in which two schools, A and B, were visited, the children from both schools attending the same canteen; the other a small town in which one school[1] (C) was visited. Tests were made in the autumn of 1941, when a reasonably good level of ascorbic acid was to be expected on account of the availability of greens, &c., and the ascorbic acid content of potatoes was at its highest. The test was repeated in the spring of 1942 when the level was expected to be lower on account of short supply of greens and deterioration of the ascorbic-acid content of potatoes due to storage.

A modified saturation test of Harris (1942) was used, the regimen being as follows:

On five consecutive days each child was dosed at 9 AM with a number of 50 mg. ascorbic-acid tablets corresponding to the body-weight, and at 11 AM was instructed to empty the bladder of urine, and then to collect all urine until 2 PM when the entire specimen was voided into the bottle provided. The urines were made acid with acetic acid, and immediately analysed by titrating standardised dichlorphenolindophenol solution with the urine until the pink colour was discharged. The children were classified into weight groups, the higher group of 7 st. receiving 10 tablets per day while the lower group of 3–4 st. received 5 tablets per day. The criterion of saturation was taken as the excretion of 10% of the ingested dose during the period of collection.

The results were classified according to particulars obtained from the children: whether they fed at canteens or at home; whether they had school milk or not, and if they were in part-time employment. A group of 107 children participated in these tests, 30 being infants (15 M, 15 F) at school A; 30 were about 12 years old (16 M, 14 F) at school B, and 46 boys at school C were aged 12–14 years. Of these children 25 at schools A and B had midday meals in the school canteen; there was no canteen at school C. Of the total, 88 children had school milk, 15 were evacuees and 19 were in part-time employment. Only 4 children (all at school C) lived with parents or guardians who had no garden or allotment.

The table summarises the results of different factors on the saturation time, and from this the following general conclusions have been drawn:—

1. Provision of school milk, as might be expected on account of its low ascorbic-acid content, especially after pasteurising or on standing, has no apparent effect on the saturation time but might have considerable effect on other levels which have not been investigated (e.g. calcium, riboflavin).

2. Saturation in the autumn had no effect on the result of the test conducted the following spring. This is readily understood, since ascorbic acid is not stored.

3. The children who have their midday meal at home evidently obtain more ascorbic acid than those who attend the canteen. This may be due to several factors;—one of which is that canteens are often precluded by high cost from providing green vegetables as often as they are provided at home; secondly the increased destruction of ascorbic acid brought about by mass cooking. This destruction is further aided by delays in serving, and by the need to keep food hot between cooking and actual serving. These losses can be minimised if the MRC instructions (1941) are followed. Macrae (1942) has shown that the loss can also be lessened by cooking a series of vegetables in the same water.

4. The ascorbic acid requirements depend to some extent upon activity, since younger children appear to need proportionately more than older ones: thus under the same external conditions the saturation time at school A was greater in both autumn and spring than it was at school B, and this held for both boys and girls. Again, boys are usually more active than girls and—especially in the spring—take a longer time to saturate. Boys who are working as errand boys, messengers, &c., out of school hours show greater differences in saturation time in the spring, but no significant difference in the autumn as compared with other boys of the same age and condition who are not working. A similar result has been seen with groups of men on a reasonably standard diet, doing different levels of muscular work.

Many of the children submitted diet returns, and at school C, of 19 boys who made this return all had potatoes daily; 1 had greens daily; 1 six times per week; 2 five times per week; 7 four times, 3 three times; 4 twice and only 1 once. As might be expected, the boys having the most greens showed the quickest response to the test. The diet was similar at both periods of the year. At school A, diet returns were only received at the time of the spring test, and while potatoes were eaten daily, and swedes, turnips and parsnips once weekly, greens did not enter into any meal—presumably on account of the season when they were finished in most gardens or allotments, and either could not be obtained or were too expensive in the shops.

EFFECT OF DIFFERENT FACTORS ON AVERAGE SATURATION TIME (AST)

—	School A		School B		School C	
	Autumn	Spring	Autumn	Spring	Autumn	Sprin
AST	Days 1·36	Days 3·52	Days 1·15	Days 2·38	Days 3·00	Days 3·37
Boys	1·25	3·87	1·10	2·60	3·00	3·37
Girls	1·45	3·27	1·20	2·17	..	..
Evacuees ..	..	..	..	..	2·91	3·33
Residents ..	..	..	..	..	3·64	3·24
Canteen fed ..	1·67	3·86	1·27	2·86	..	..
Home fed ..	1·23	3·33	1·00	2·18	3·11	3·23
Working ..	..	..	1·00	2·67	2·90	3·67
Not working ..	1·36	3·52	1·10	2·00	3·23	3·14
Took part in both tests; previously saturated ..	1·38	3·62	1·12	2·37	3·35	3·14
With school milk	1·46	3·57	1·13	2·36	3·04	3·32
Without school milk ..	1·00	2·80	1·20	2·00	2·66	5·00

Diet returns were not obtained at school B for the autumn test, but those obtained in the spring showed that while all children had potatoes, only 5 out of 18 had greens, 4 having them once weekly while the remaining child had them 4 times per week. Quantities and size of helping were not recorded on these returns as the children tended to give exaggerated figures. Computations made of the ascorbic-acid content of these meals were necessarily rough.

The boys at school C who had greens 4 or more times a week had a daily average intake of 20 mg. ascorbic acid, while many of the other boys' intake lay between 10–15 mg., some even falling below 10 mg. In the spring very few returns showed a figure of 20 mg., the majority lying between 5–12 mg. with a few in the neighbourhood of 15 mg.

While there does not appear to be any serious deficiency of ascorbic acid in the children examined, such deficiency as there is can be easily rectified either by improved methods of cooking, especially in the canteens, or by small daily supplements of pure ascorbic acid. With a daily intake of even as little as 10 mg. ascorbic acid, true scurvy is not likely to be seen, but various subclinical states may appear, and it was this possibility which led to this work being undertaken.

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[1] The canteen in the garden city was "G" in the series referred to by Marrack and his colleagues (1942).

Harris (1942) during his investigations on children and others found there was a seasonal tide, the levels being low after the winter and higher after summer. The results obtained here support Harris's findings, while for naval ratings and civil engineers, McNee and Reid (1942) have found similar results.

SUMMARY

An investigation to determine the level of nutrition [illegible] undertaken on 107 [illegible] 1941 and repeated in [illegible] ified saturation test.

The results indicated: that saturation was achieved more quickly in autumn than in spring; that school milk had no effect on saturation time; that saturation in autumn had no effect on the findings in spring; and that children who took their midday meal at home got more ascorbic acid than those who attended the canteen.

Note by Professor MARRACK

During the same week in which samples of meals were taken for our previous ascorbic-acid study (Marrack et al. 1942), saturation tests were performed on 6 boys at schools E and F who partook of these meals. The method used was that of Harris (1940) and the criterion of saturation was the excretion of 50 mg. ascorbic acid in the urine collected in the period 4–6 hours after the test dose was given. The results given below are in good accord with the estimates of ascorbic acid in the meals. Tests made on 3 boys at school C, two weeks after the meal samples were collected, may be considered intermediate.

AVERAGE SATURATION TIME

School	Av. ascorbic acid per meal (mg.)	Saturation time (days)
E	24·5	2·67
F	8·0	3·83
C	16·0	3·67

Owing to an oversight the fourth-day urines were not collected at school E, but the boys were saturated with ascorbic acid by the third day. One boy at this school ate raw vegetables daily for tea and supper.

We wish to thank the County Education Officer and the County Medical Officer of Health for their assistance with this investigation, Miss N. Baxter for her technical assistance and the school staffs and parents for their active collaboration. Thanks are due to Messrs. Roche Products Ltd. for the ascorbic acid tablets used and for laboratory facilities, and to the directors of the firm for permission to publish these results.

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Infectious Disease in England and Wales

WEEK ENDED AUG. 21

Notifications.—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 1516; whooping-cough, 2015; diphtheria, 527; paratyphoid, 8; typhoid, 13, measles (excluding rubella), 1049; [illegible] influenzal), 312; puerperal [illegible] fever, 38; poliomyelitis, 16, [illegible] ncephalitis lethargica, 3; dysentery, 198; ophthalmia neonatorum, 90. No case of cholera, plague or typhus fever was notified during the week.

Deaths.—In 12[illegible] from an enteric fe[illegible] fever, 12 (0) from [illegible] 48 (10) from diarr[illegible] 9 (3) from influenza. The figures in parentheses are those for London itself.

There were 5 deaths from diarrhœa at Liverpool, 4 at Leeds. Manchester reported 3 fatal cases of whooping-cough.

The number of stillbirths notified during the week was 193 (corresponding to a rate of 32 per thousand total births), including 14 in London.

Letters to the Editor

TUBERCULOSIS NURSING

SIR,—Anyone who is not familiar with the facts might conclude from your annotation of Aug. 21 that an attempt was being made to decoy a section of nurses from the bosom of the General Nursing Council, and to establish a separate or "isolationist" group. This is a neat reversal of the true position. In the past the nursing of the tuberculous has been carried out in the main by young women on the fringe of the nursing profession who have time and again sought recognition [illegible] but the response has always been unsympathetic. It is only dire necessity and Rushcliffe which have engendered some tardy interest in this serious problem on the part of the nursing authorities.

The standard of nursing in the sanatoria in England, Scotland, Wales and Northern Ireland has been raised and for many years maintained at its present high level entirely by the efforts of the Tuberculosis Association—a voluntary body of medical men. The value of the nursing certificate issued by this association has been increasingly recognised by the local authorities, sanatorium matrons and the nurses themselves. There are at the present time few tuberculosis institutions which do not avail themselves of the training scheme established and maintained by the association. What has been established is, in effect, a special register for nurses trained in this important and specialised field of work. It is recommended (not "suggested") by the Rushcliffe Committee that such a register should be kept not by the association but by the General Nursing Council: it is maintained by the GNC that the register should be abolished.

Those who are engaged upon the treatment of tuberculosis know that a rather higher standard of nursing intelligence and personality is required for the successful management of these cases than is often needed on the wards of a general hospital. Moreover the knowledge required is specialised and the treatment of the individual cases may extend over a period of 9 months, a year or even longer. Your annotation gaily submits that the case can be met by assistant nurses and by nurses lent for 3 months from another hospital. I have seen the latter scheme in operation under the most favourable conditions. It has great advantages for all concerned and should undoubtedly be continued. But it does not go very far [illegible] numbers and it introduc[illegible] [illegible] ie large tuberculosis hospital or sanatorium can be solved in the same way as it is solved in the large general hospital and in no other way: by the establishment of a training school for student nurses. Many of the nurses who receive a training in tuberculosis for 2 years can be persuaded to go on subsequently to general hospitals for their general training. But some do not wish to, and some indeed are not suitable to do so. Nevertheless all should be encouraged to attain the standard set by the Tuberculosis Association and thus become valuable practical tuberculosis nurses whether they intend to proceed to general training or not: and they should be entitled to a certificate if as a result of their efforts they become proficient. They should, in fact, be trained to the maximum of their capacity and not to the minimum standard suggested for assistant nurses. Your annotation regards the recommendation that the GNC should take over this valuable work from the TA as an attempt at "isolationism." I submit that the reverse is true.

[illegible] pressure of work, and the strain of more harassing examinations. Mental nursing and tuberculosis nursing do not appear to me to have anything in common, although you indicated in your annotation that they have.

In existing circumstances a nurse who has trained on the wards of a fever hospital and has thus achieved state registration, can become a staff nurse in a sanatorium, knowing little or nothing about tuberculosis; whereas a nurse having trained for 2 years in a sanatorium and holding the certificate of the TA is denied such a status. It is surely not to be expected that tuberculosis nurses will remain satisfied with such a position.

L. E. HOUGHTON,

County Sanatorium, Harefield, Msx.

Hon. secretary to the examination committee of the Tuberculosis Association.

*** Dr. Houghton has misread the annotation in one particular. Our suggestion was that sisters, charge nurses and staff nurses should all be required to hold the SRN certificate; and we added "There would also have to be a large permanent staff of trained assistant nurses . . ."—ED. L.

SIR,—To set up a separate register for nursing in tuberculosis would indeed be a retrograde step. Tuberculosis must not be regarded as a separate entity and it is to be hoped that the future regionalisation of medicine will provide facilities for the student nurse, no less than for the medical student, to become acquainted with it as part of a general training. The nurse will learn, among other things, the time factor in the taking of temperatures, the management of contacts, the importance of regarding the family as a unit and how to protect herself and other patients in the ward against infection. At present sanatoria do not attract the best type of nurse. Actually the nursing of a disease so chronic as tuberculosis, in which the willing coöperation of the patient is essential, requires qualities of understanding, social conscience, resourcefulness and appreciation of psychology far higher than the more dramatic nursing of acute disease. Such work implies a high standard of education and a knowledge of social medicine which is nowhere better exemplified than in tuberculosis. It is surely time finally to discard the belief that medicine can be divided into water-tight compartments and that any part may be considered without relation to the whole.

Wimpole Street, W.1. PHILIP ELLMAN.

THE REFUSAL TO REMEMBER

SIR,—Your annotation of Aug. 21 (p. 231) covers but a small corner of a big field. Overt amnesia ranges from the temporary forgetting of a name to a change of personality lasting for years, as in the classical example of Ansel Bourne described by William James, and to study it only as a means of escaping blame or punishment misses a lot. A striking example occurred some years ago when four men, engaged among others in deep-sea diving, behaved strangely and claimed to have been unconscious during the dive. With Surgeon Lieut.-Commander Phillipps I investigated the episode and found that the men already suffered from psychogenic symptoms—phobias and the like—before the diving, that the deep-sea environment produced a sudden claustrophobia with an access of terror, and that the memory of the terror had been suppressed, the declared unconsciousness taking its place. My colleague's description of the revival of the memory in one case will bear repetition:—

> "With sweat like a stream of water running down a face the colour of chalk, dilated pupils and rolling eyes, he went through all the emotions of the dive, sobbing and tearing at his clothes under the impression that he was again in his diving suit, and clawing at his face to pull off the imaginary face-glass. It was a picture of stark mad terror and the impression it left is difficult to discribe. No earthly power could then have got him near a diving-suit.
>
> "The interview lasted until about 10.30 (from 9.0) and when he had 'come to' again there was an immense improvement in his condition. The deep sigh which heralded in the return to external consciousness was indicative of the dam which had been loosened" (*Proc. R. Soc. Med.* 1932, **25**, 693).

In my work twenty-five years ago losses of memory for terrifying incidents of warfare were a commonplace and their revival was often accompanied by an abreaction of dramatic intensity. Such amnesias ultimately proved to form a sequence with the amnesias that psycho-analysts le to uncover, including that amnesia for childhood experiences to which we are so accustomed that it fails to arouse our curiosity. In their simple form they are technically a kind of hysterical dissociation; yet they seem to bear little relation to the amnesias or hysterias that formed the subject of your annotation, in which the alternative of malingering seemed so obvious.

London, W.1. MILLAIS CULPIN.

DIPHTHERIA IN THE INOCULATED

SIR,—As one concerned with diphtheria cases in hospital, I read Dr. Neubauer's article (Aug. 14, p. 192) with interest, but I take exception to certain views expressed therein. Neubauer is at some pains to represent diphtheria in the inoculated subject to be "a different disease" from diphtheria in the non-inoculated. In my view any such distinction is untenable. He describes faucial appearances which, he suggests, are peculiar to diphtheria in the inoculated, but I cannot agree that such exist. In fact, what he describes is *mild* diphtheria which may (and often does) occur in the non-inoculated as in the inoculated subject; for partial immunity may be natural as well as artificial.

Neubauer states that in the inoculated subject "diphtheria becomes . . . much more difficult to diagnose." Certainly it is often impossible to distinguish a *mild* diphtheria from other kinds of tonsillitis by mere inspection of the fauces, but this difficulty existed before immunisation was practised. In short, if the tonsillitis is mild, diagnosis by inspection is impossible whether or not the patient has been inoculated. Conversely, severe diphtheria in an immunised person (very rare) could be diagnosed at a glance, as in anyone else.

And what about the sequelæ of this "different disease"? According to Neubauer, diphtheria in the inoculated caused palatal paralysis, peripheral neuritis and (most noteworthy) myocarditis. It seems that the toxic manifestations, at any rate, are very like those of "typical diphtheria," "ordinary diphtheria" and "common diphtheria"—three other varieties mentioned in this article. It will be wise, I think, to eschew these imaginary distinctions, and to recollect that clinical diphtheria ranges from very mild to very severe according to the immunity possessed by the individual together with the virulence of the infecting germ.

The gist of Dr. Neubauer's article seems to be that diphtheria in immunised persons is usually mild, or (to paraphrase) that inoculation confers immunity. With this conclusion I am in entire agreement.

Cottingham, E. Yorks. NIGEL W. ROBERTS.

NATIONAL HEALTH INSURANCE AND ASSUMPTION B

SIR,—National Health Insurance, at its inception in 1911, represented a great contribution to the social services of this country, placing a medical service at the disposal of sections of the community which found difficulty in obtaining it themselves. But does it provide a framework into which the medical services of the future can be fitted? Has the time not come when its organisational forms represent a brake on progress rather than a spur thereto?

This question is important especially in view of the BMA council's suggestion that implementation of Beveridge's Assumption B would, for the moment, be met by a "two-way" extension of NHI. On this suggestion we offer the following observations:—

(*a*) NHI is based on the individual practitioner, with his own professional equipment and accommodation. (This statement is not, in general, invalidated by the development of partnerships.) It is impossible, within its forms, to develop that coöperative teamwork which is demanded by the increasing technical complexity of medicine and its allied services.

(*b*) NHI tends to degrade the general practitioner into a mere sifter of cases, unable to devote a sufficient time to their consideration because of the numbers to be seen under the conditions it imposes. As he has to provide a 24-hour service, seven days a week, with little possibility of any private or social life outside his professional work, his chances of putting into practice those clinical ideals he had on leaving his medical school are slight indeed. Preventive medicine, and research work in his own sphere of activity, are closed to

him His growth to
which are rightly his
vis a vis his patient
To say so is in no sense to criticise the body of insurance practitioners—which gives loyal and devoted service—it is to criticise the system under which these doctors work

(c) A two way extension of NHI cannot solve any of the o problems On the contrary it will aggravate them, and at the same time, strengthen the position of the approved societies with consequent economic loss to patient, doctor and national health What the public needs is a health service maintained by a completely unified profession operating as a single instrument to bring every aspect of scientific medicine within the reach of every member of the community The profession, on its side needs an organisation that will enable its members to produce their best clinical work in the best conditions—good income, reasonable hours of work, holidays pensions, modern professional accommodation, adequate equipment lay assistance that will relieve practitioners of non clinical work and the possibility of living privately

(d) To extend and develop NHI is to push further away into the distant future the o desirable and necessary improvements

The BMA council's recommendation represents a slipping back from the decisions on group practice made at last year's Annual Representative Meeting and a definite retreat from Assumption B

H C Boyde	P Inwald
D S Bryan Brown	H Joules
L Fieldman	R Poots
W W Fox	J Powell Evans
H Gainsborough	J A Scott
P D'Arcy Hart	S Smith
	B C Thomson

*** The proposal to meet the present situation by extending National Health Insurance to the dependants of insured persons is considered in our leader columns —Ed L

TRAINING SCHEME FOR MISFITS

Sir —One of your peripatetic correspondents (Aug 7, p 171) is frankly puzzled over the experiment which is designed to bring into the war effort such of those industrial and social "misfits" whose condition can be ameliorate nt, as
proposed erhaps
the reason factor
in the scheme has apparently escaped notice The Minister of Labour has discretionary powers to direct registered persons to employment *with a condition of residence* The exercise of these powers is vital to the experiment

S Neville Rolfe
Tavistock House South W C 1 Hon Secretary, BSHC

SUDDEN SENESCENCE

Sir —As author both of the irrelevant title' and the discussion of the paper criticised by Dr Russell Fraser, I feel that a short answer is required

1 If a virile, athletic, black haired and energetic man
impotent bald
of the apparent
den Senescence'
is irrelevant Anyway, does it matter much what a paper is called?

2 I have seen hundreds of patients who have suffered from months of anorexia and anxious depression without developing this syndrome I cannot therefore dismiss it with so facile an explanation But supposing Dr Fraser is right are we not justified in asking *why* the anorexia should produce so remarkable a result?

3 The order of the loss and subsequent return of the patient's hair were typical of alopecia" (Fraser) Quite so baldness is often typical of baldness Alopecia is not a disease, but a symptom of disease Paterson and I were therefore justified in seeking an explanation rather than a label

stated categorically that our patient could not be regarded as suffering from panhypopituitarism Compare Though loss of pubic hair is characteristic of Simmonds's disease, total alopecia is not" (G and P) with 'Scalp and eyebrow hair are never more than thinned in uncomplicated Simmonds's disease' (Fraser)

5 "Alopecia totalis and allied disorders of hair growth have often been noted as occasional complications both of severe infections and of blood disorders especially those of sudden onset and with associated impotence, anorexia and weight loss ' (Fraser) Quite so we quoted several such But *why*?

6 The evidence does not justify ascribing it to the hypothalamus (Fraser) That is why we used such phrases as it seems probable that the explanation should be *sought* [in the hypothalamus] and it is interesting to speculate We stated a prima facie case for inquiry but delivered no final judgment

Whitchurch Aylesbury RAYMOND GREENE

AGE OF RETIREMENT

Sir —I think it is time for the question of the retirement from hospital staffs at the age of 60 (or even at 65) to be reviewed as at that age in the majority of cases men are at a useful period of their professional lives in view of their experience and knowledge As to their physical condition, if men in the sixties are in control of the naval and military activities on the battle front it is obvious that men should be able to carry on at such an age on hospital staffs

Bath H Norman Barnett

HOP DERMATITIS

Sir,—I should be interested to hear the views of those with first hand knowledge of hop picking as to the possible ætiology of hop pickers conjunctivitis and dermatitis The well
known for their , and
the pale tussock wn as
the hop dog from its habit of feeding on this plant (and also the hazel and other trees) from July to September I have not heard of any dermatitis in those who handle hops in subsequent processes or in those
whose ski
White me
pillar has
to prevent

Solihull G P B Whitwell

A NEW REFLEX

Sir,—While investigating the central nervous system of a case of paraplegia with a negative Wassermann which I thought might be of bilharzial origin, I found an interesting reflex which as far as I have been able to discover has not been described before It is a percussion, but not a stretch tendon, reflex , the method of eliciting it is as follows

Sit the patient up in bed with the heels together and the legs partially abducted (tailor fashion) If you now percuss the spine from above downwards with a pliable percussion hammer you may or may not in a normal person obtain a slight contraction of the adductors of the thigh usually at the level of the 3rd and 4th lumbar vertebra

In about two thirds of the 75 cases of different kinds in my wards there was no response at all , but 15% of the cases with no nervous manifestations at all gave a slight adductor response , this shows that the reflex is difficult to elicit but does occur in normal persons In upper motor neurone lesions, however, there is in most cases a very definite contraction of the thigh adductors —especially in paraplegias In one case of paraplegia the response began at the 11th dorsal vertebra and increased as I percussed down the lumbar region Moreover the response was not confined to the adductors of the thigh , the muscles of the shoulder girdle also contracted and the whole body shook A case of paraplegia with a positive WR, and a case of amyotrophic lateral sclerosis, both showed a well marked adductor response Three cases of pellagra with weakness of the legs and increased reflexes—one with an indefinite extensor plantar response—also showed a well marked *contraction. Cases of* hemiplegia also show the sign, sometimes slightly and sometimes actively in the paralysed limb A case of flaccid paralysis, with absent knee jerks but with ankle-jerks present, showed no adductor jerk on spinal percussion; the patient died a few hours later and autopsy showed extensive cerebral hæmorrhage. Four cases of Pott's disease without signs of spinal pressure gave no adductor response. Similarly two cases of neurasthenia with a functional increase of stretch-tendon reflexes failed to give the adductor response to spinal percussion.

Cairo. A. CECIL ALPORT.

Obituary

JOHN MURRAY

MB DUBL, FRCS

Mr. John Murray, consulting surgeon to the Middlesex Hospital, died at Exmouth on Aug. 16 at the age of 80. He was born at Monkstown, the son of a Dublin solicitor, and educated at Repton and at Trinity College, Dublin, where he graduated in arts in 1881 and in medicine two years later. Soon after qualification he migrated to London where, while holding a resident appointment at the Temperance Hospital, he met Alfred Pearce Gould through whose kindly offices he gained a footing at the Middlesex. He became surgical registrar there in 1893 at a salary of £40 a year, £12 of which was withheld until he had written his annual report. His duties included attendance at all operations, supervision of all clinical notes, and the cutting and staining of all microscopical sections from material removed at operation. With this upbringing it is scarcely surprising that Murray viewed with dismay the present system of attaching a surgical registrar to each firm. When he was appointed assistant surgeon in 1896 operations were performed only on Wednesday afternoons, and as the new junior he had to wait till the end when his seniors had finished. He became surgeon to outpatients in 1903 and full surgeon four years later. He had been appointed dean in 1902 and for six years, made uncertain by the question of amalgamating much of the teaching of the smaller school, his business-like abilities kept intact the foundations of the Middlesex school.

Lafayette

At the beginning of the last war Murray was called up as a captain RAMC (T), and his son, J. D. R. Murray—then a junior OTC cadet, now on the staff of the Exmouth Hospital—recalls being consulted on the meaning of "slacks" and how to salute. Murray's work at the 3rd London General was exacting and nearly every morning he caught a train for Wandsworth from Regent's Park tube station at three minutes past nine. Middlesex still exacted four afternoons a week. In 1915 he was elected to the court of examiners of the Royal College of Surgeons. He also examined for the University of Birmingham and for the RN medical service. Examinations then started late in the afternoon and often lasted until 10 PM, but he enjoyed this work which brought him in contact with colleagues from other hospitals and few examinations went by without his entertaining his fellow examiners at his home. And they appreciated his Irish temperament, for one has said that though it was possible to quarrel with Murray it was impossible [illegible] to like him. A born teacher he was appointed to [illegible] e lectureship in 1900 and as late as 1927 he pre-[illegible] over a stimulating class in operative surgery, [illegible] g at 8.30 AM, which included Freddy Roques, Eric [illegible], and Arnold Walker. When Murray retired the [illegible] year he remained in London, giving much of [illegible] time to St. Saviour's Hospital with which he had been [illegible] ciated for many years, but in 1934 a serious illness [illegible] terrupted this work also. In 1938 the prospect of war drove him to the West Country where his retirement was cheered by visits from old friends.

Murray was a keen freemason and was long a leader in the affairs of hospital masonry. Outside his work cricket, tennis and golf each had their reign but billiards outlived them all, and on lonely evenings he would practise shots for hours.

He married Miss Gertrude Mills-Baker as his second wife in 1906 and they had a son and a daughter.

CHARLES MACFIE CAMPBELL

M D EDIN, DIPL. PSYCHIAT. USA

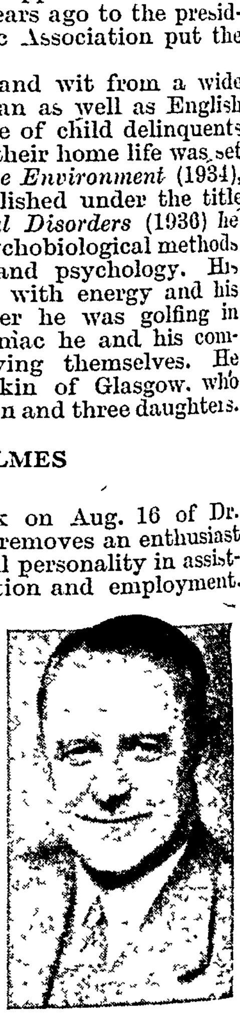
THE death has been announced in the USA of Dr. C. M. Campbell, professor of psychiatry at Harvard University and director since 1920 of the Boston Psychopathic Hospital. Born in 1876, the son of an Edinburgh banker, Charles Campbell was educated at George Watson's College and the University of Edinburgh where he graduated MA in 1897 and MB in 1902. After stimulating wanderjahre spent in the study of clinical neurology with Pierre Marie at the Bicêtre and of histopathology in Nissl's laboratory at [illegible] returned to Edinburgh as assista[illegible] Morningside. His enthusiasm, humour and clinical acumen made his ward rounds memorable and it was a blow to both colleagues and students when in 1908 he accepted an invitation to join the staff of the Ward's Island Psychiatric Institute, New York; and this migration was to be decisive, for after a further two years at Bloomingdale he became in 1913 assistant professor of psychiatry at Johns Hopkins and in due course applied for American citizenship. His election a few years ago to the presidency of the American Psychiatric Association put the sign-manual on his assimilation.

Campbell wrote with lucidity and wit from a wide background of French and German as well as English literature. His special knowledge of child delinquents and the need for investigation of their home life was set out in *Human Personality and the Environment* (1934), while in his Salmon lectures published under the title of *Destiny and Disease in Mental Disorders* (1936) he pleaded persuasively for broad psychobiological methods of study in clinical psychiatry and psychology. His short stocky figure was compact with energy and his zest was infectious. But whether he was golfing in Scotland or bathing in the Potomac he and his companions were sure to be enjoying themselves. He married in 1908 Dr. Jessie Rankin of Glasgow, who died some years ago; they had a son and three daughters.

GEOFFREY HOLMES

M B CAMB

THE sudden death at Matlock on Aug. 16 of Dr. Geoffrey Holmes at the age of 57 removes an enthusiast for physical therapy and a forceful personality in assisting schemes for its fuller recognition and employment. Born at Chesterfield and educated at the Grammar School there he went to Caius College, Cambridge, where his gaiety, his lack of smooth-tongued diplomacy (only grudgingly employed in later years) and his loyalty to friends are recalled by his fellow undergraduates. He went to St. Mary's Hospital, Paddington, qualifying in 1911 and coming deeply under the spell of A. P. Luff to whom he was house-physician. A house appointment to the Devonshire Hospital for rheumatic diseases at Buxton decided his career, but when war broke out in 1914 he joined the RAMC and served in France until his health broke down. When he recovered he took over the work of a Harrogate physician who went on service and at the end of the war he joined the staff of the Royal Bath Hospital, building up a large general and spa practice. Encouraged by Dr. Edgecombe he continued to study hydrology, working first with Whitridge Davies on the effects of warm immersion baths on the circulation and later becoming at Leeds the first university lecturer in hydrology in this country. He had a hatred of humbug of any kind, hiding under a bluff and sometimes aggressive manner a keen intellect and the wide knowledge displayed in his presidential



Debenham Paull

address to the RSM section of physical medicine He was on the scientific advisory committee of the Empire Rheumatism Council and one of the foundation members of the recently formed British Association of Physical Medicine In 1937 after twenty strenuous years he succeeded G. C. R. Harbinson as senior physician to Smedley's at Matlock, and a few months ago he returned to Buxton, this time as a member of the staff of the Devonshire.

Holmes had travelled much and was known in many continental spas where his reputation as a connoisseur put his hosts on their mettle and his geniality put them at their ease. At home he was the ideal host. He was an ardent and skilful fisherman and found an immediate bond of union with any other fisherman whom he met. He did not avoid the frictions engendered by differing medical political views or gloss over any lack of support from colleagues but met them frankly and fearlessly For some time he faced his not unexpected but all too early end with fortitude He leaves a widow and a son who is training for the medical profession.

DENIS LOUIS THOMAS MACSHERRY

MRCS, SURGEON IN THE MERCHANT NAVY

Dr. Denis Macsherry, only surviving son of Dr. Maurice Macsherry of Edgbaston, was killed by enemy action at sea during April. He was one of a group of class-mates who joined the Merchant Navy soon after qualification and he is the third of them to lose his life

Macsherry was educated at St. Anthony's, Eastbourne at Beaumont College and at Kirchschlag in Austria He studied medicine at Birmingham University and the Rotunda, Dublin, qualifying in 1912. He was a competent linguist and an expert oarsman and boxer His only brother, a fighter pilot, was killed in action two years ago. Mr. J N. Sankey writes. As a student Macsherry sometimes appeared casual but he was gifted with shrewd common sense and a sympathetic outlook. Before and for a short time after qualifying he was house-surgeon at the Birmingham Accident Hospital which had lately been opened in the building of the old Queen's Hospital where he had spent most of his days as a clinical student Macsherry was popular with his fellow students and as a hospital resident was an excellent officer. Few will forget his pale but striking face, the laughing eyes, the inseparable monocle, the stocky frame, and those of us who knew him well will always remember his loyalty, good humour and companionship.

THE LATE MAJOR STRAUSS

Sir Philip Manson-Bahr writes I would like to pay my tribute to the memory of Major J. N Strauss, whose death from smallpox was reported in your issue of August 21 He was one of the keenest and most original house-physicians with whom I have been associated He had a fine clinical sense, was painstaking to a degree, and tireless in his efforts for the welfare of his patients I have good reason to be grateful to him for considerable help in preparation of my book on the dysenteric disorders. Since he was posted to West Africa we had corresponded regularly and I was impressed with his keenness and freshness of outlook He had within him the ability to do great things and it is a tragedy that, characteristically, owing to devotion to his patients, he should have contracted this virulent and fatal infection

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[illegible] BE, MRCP, who died [illegible], was consultant to [illegible] and its technical [illegible] Byrne graduated MB from the University of Liverpool in 1900 and joined the RAMC two years later. After serving through the [illegible] on account of ill health and [illegible] nk in Egypt. Besides his [illegible] he examined in his specialty at the Egyptian University and in 1930 he published investigations into the incidence of plague in Alexandria. At the outbreak of this war he became liaison officer between the Egyptian Government medical service and the Royal Navy, Army, RAF, and Allied Forces and the service authorities found his help invaluable in providing hospital facilities for the treatment of prisoners of war Where British troops were employed in out-of-the-way places remote from British medical facilities Byrne was able to organise the civilian services so as to provide adequate treatment for them, and last year he was awarded the CBE in recognition of his work on behalf of British troops in Egypt

Dr. MARTIN HALLAM, who died at his home at Yalding, Kent, on Aug 18 came of a medical family, and was educated at Repton School the London Hospital and Sheffield University After qualifying MRCS in 1909 he held resident posts at the Royal Hants Hospital, Leicester Royal Infirmary, Wolverhampton General Hospital, and the Jessop Hospital, Sheffield. He served in the RAMC during the last war, afterwards setting up in practice at Yalding, and for some years he was anæsthetist to the Kent County Ophthalmic Hospital His pleasure was country life, and from his early youth he had a never failing fondness for birds, trees, and flowers He is survived by his wife, a son Squadron Leader Ian Hallam who is a prisoner of war in Germany, and a daughter.

Parliament

Sir FRANCIS FREMANTLE's death on Aug 26 was unexpected by his colleagues in the House as during the last days of the session before the summer adjournment he seemed in particularly good form We adjourned on Aug 5 and on the previous Tuesday Sir Francis and three other MPs went from Waterloo together into Surrey to spend a day inspecting the Army School of Hygiene and No. 1 Depot of the RAMC We walked about seeing huts, lecture rooms, water sterilising apparatus, first aid demonstrations We [illegible] on to deliver [illegible] constituency of Hatfield at the opening of a week's series of discussions on political and social policy A fairly strenuous day for a man over 70 (which he didn't look), and at the end of a period of the session in which many younger men were tired out

Fremantle was well known to all in the House and especially to the medical MPs by virtue of his chairmanship of the all-party committee of medical parliamentarians He aimed to put forward an impartial medical view not only on such subjects as the decline of population, on which he made his last speech on July 16, but on non-medical topics too Some Labour and *Liberal MPs thought Fremantle* was *too much of a Con*servative, and he certainly had a very high opinion of the Conservative Party, but he did in fact always try to get before the House a medical scientific and objective view of whatever was under discussion It is not easy to do that and achieve brilliance—but it is probably one of the most useful things at which any member can aim.

Fremantle's conscientious devotion to his duties was shown not only by his regular attendance, but also by the careful order in which he kept his piles of correspondence and documents in his locker at the House. There was one privilege which his position in the medical world, and his personality, obtained for him—that of the use of a special small table in the House of Commons library, where he was for years in the habit of working and where he could usually be located during the sittings

His friendly and very courteous presence will be much missed by his medical colleagues and by all members of the House He had the endearing habit occasionally of committing a spoonerism as when in the population debate he demanded [illegible] servatives"—and the [illegible] human imperfections [illegible] work in the House, mostly behind the scenes, and it is to be hoped that his party will find another representative of the medical profession in its scientific aspect to carry on that good work on a foundation Fremantle had well and truly laid.

MEDICUS MP.

Notes and News

SICK MARINERS OF ENGLAND

OUR review of current ills endured by the sailor (Aug. 14, p. 199) took no account of those he has at last escaped. Surgeon Commander R. S. Allison in a stirring book (*Sea Diseases.* Bale. 25*s.*) blames two main factors for sickness on shipboard: the discovery of the mariner's compass which made long voyages possible; and the changes in ship design which sacrificed living space to guns and munitions. "Men lived," as he says, "in a perpetual state of overcrowding, and the closed tiers of decks ranged one on top of another became an ideal breeding place for infection." At the time of Vasco da Gama (1497) no sickness was expected on his voyage round the Cape of Good Hope to India; his ships therefore carried no medical stores and his crew suffered dreadfully. Improvements in naval hygiene, rather than advances in clinical medicine, reduced the naval mortality during the last century; yet, as Allison shows, the fight against disease at sea is really a record of the resistance of the Lords of the Admiralty to reforms which clinical medicine had long shown to be imperative. Though some of the pioneers were Navy surgeons, the foremost writer on maritime medicine of the seventeenth century was John Woodall, a surgeon to the East India Company. Allison ranks highly his two books *The Surgeon's Mate* and *The Viaticum being the Pathway to the Surgeon's Chest.* Woodall knew how to cure and prevent scurvy and published his advice as early as 1617; for he had learnt it from Sir James Lancaster, the greatest of all English shipmasters. Credit goes to him and to Hawkins, another non-medical pioneer, as the first to prevent and cure scurvy. Prevention and cure were thus discovered before the disease had been described by physicians, but a medical writer called Ronsseus, in 1564, spoke of seamen in long voyages curing themselves by the use of oranges.

Allison's description of conditions at sea in the seventeenth and eighteenth centuries depicts the full beastliness of living conditions. He does not rely so much on Smollett as on other less widely read non-fiction authors. The *Implacable* is still afloat and one of the illustrations to this book shows her gun deck. When Thomas Dover sailed as chief physician with Woodes-Rogers round the world, there was sickness and some scurvy in the ship but only two of the men died, "which speaks," writes Allison, "very highly for the medical arrangements." Little was required of sea surgeons except that their medical journals should be accurately kept. He speaks of their duties, he quotes Gardner as paying high tribute to the skill and devotion of many of them, he gives a list of distinguished physicians appointed to go to sea with the Fleet as early as 1691, but he does not show that they could exercise any authority. Allison gives high praise to James Lind and Thomas Trotter. No-one could read Trotter's *Medicina Nautica* without giving him first place amongst the Navy surgeons. Lind's book falls far behind it for first-hand observation, being practically a compendium of the writings of others. Allison sums him up: "To Lind should be awarded the credit as the pioneer of dress reform in the Navy." Although Lind quoted Ronsseus correctly and described the value of oranges and lemons as antiscorbutics, he must accept the responsibility of stating that "lime-juice will do just as well." He had authority enough to secure the introduction of lime-juice into British ships, but was too little interested to discover that lime-juice never did prevent scurvy. He was reluctant, too, to allow that abstinence from greens and vegetables is more than an occasional cause of scurvy. Lind is credited with having inspired Captain Cook with the advanced principles of naval hygiene practised on his secod voyage round the world in 1772. Yet Cook wrote to Sir John Pringle in 1775: "I entirely agree with you that the dearness of the rob of lemons and oranges will hinder them from being furnished in large quantities; but I do not think this is so necessary for though they may assist other things I have no great opinion of them alone."

Medical officers to naval hospitals "lived outside the hospital, directing their energies to private practice, neglecting official duties." This led to the appointment of executive officers as governors or captain-superintendents from 1795 until 1869. But the system caused dissatisfaction among the medical staff and had to be abandoned.

Gilbert Blane, another pioneer of reform, was William Hunter's pupil and was introduced by him to Sir George Rodney, Commander in Chief, to whom even the Lords of the Admiralty had to listen. Blane's success in introducing medical reforms into the Navy was almost entirely due to Rodney's support. In the nineteenth century health at sea definitely improved and Allison attributes this to various factors—advance of medical science, fewer wars, abolition of the press gang, improvements in naval diet and hygiene, and "last but not least to the coming of the steam engine and the iron ship."

MILK AND PASTEURISATION

"The official regulations require the heating of milk at not less than 145° F. for not less than 30 minutes." This is what Mr. A. T. R. Mattick, PH D, said at the discussion on July 3 (*Lancet*, July 17, p. 83), and we regret that he was misreported. He did not say that "holder" pasteurisation was being replaced by the "flash" system, but that the former was being superseded by high-temperature short-time processes.

Society of Apothecaries of London

At the election court of assistants on Aug. 17, Sir Stanley Woodwark was elected master for his third consecutive year of office, Dr. J. P. Hedley senior warden and Dr. Hugh Powell junior warden. Dr. H. S. Morley was unanimously elected to a seat on the court; Edward Leslie Moll to the livery; and Horatio Alexander Cowan and Frank Neon Reynolds to the freedom of the society.

The diploma of the society was granted to the following: I. D. Henderson, B. A. Gould, G. R. S. Jackson, J. M. Macdonald, J. C. F. Poole, A. M. Rajah, N. Sachse, C. D. Sanders, J. H. S. Scarlett, W. M. Thomas, and J. K. Wilson.

Medical Casualties

Surgeon Lieut.-Commander N. W. Pryde, MB NZ, Royal Marine Commando, was killed in action during July.

The following RAMC officers have been posted as prisoners of war: Major J. W. D. Bull, MRCP; Lieutenant R. H. Cuthbert, MB EDIN; Captain H. D. T. Gawn, MB BRIST.; Lieut.-Colonel John Huston, MB BELF.; Lieut.-Colonel L. R. S. Macfarlane, MB DUBL.; and Captain Emanuel Snell, LRCPE.

Appointments

CRAN, E. M., MB, DPH: temp. asst. MOH for Harlow.

LINFORD, HILDA, MD, FRCS, MMSA: permanent asst. MOH for Harlow.

LUFFMAN, P. S., MRCS: examining factory surgeon for Burnham Market, Norfolk.

NEGUS, T. H., MB LOND., DO: hon. ophthalmic surgeon to the Taunton and Somerset Hospital.

NICOL, AILEEN A., MB ABERD., DPH: senior asst. MOH for maternity and child welfare for Norwich.

Births, Marriages and Deaths

BIRTHS

CORMACK.—On Aug. 24, at Ayr, the wife of Mr. Robert Cormack, FRCSE—a son.

DAWES.—On Aug. 22, at Oxford, the wife of Dr. G. S. Dawes—a daughter.

MAIR.—On Aug. 27, in London, the wife of Captain J. T. Mair, RAMC—a daughter.

MALLETT.—On Aug. 24, at Woking, the wife of Surgeon-Lieutenant A. E. de la T. Mallett, DSC, RNVR—a daughter.

MONTGOMERY.—On Aug. 22, at Bicester, the wife of Captain A. P. D. Montgomery, RAMC—a daughter.

WILKINSON.—On Aug. 23, in Birmingham, to Dr. Agnes Wilkinson (née Crozier), wife of Prof. K. D. Wilkinson, FRCP—a son.

MARRIAGES

LARGE—SHAW.—On Aug. 20, at Kingston-on-Thames, Stanley Dermot Large, DSO, MC, lieut.-colonel RAMC, of Alloa, to Constance Murison Barnsley Shaw, captain RAMC.

MELLOR—BRODIE.—On Aug. 21, in London, William Franklin Mellor to Georgie Brodie, MB.

MORGAN—MORGAN.—On Aug. 21, in London, R. E. P. Morgan, chief officer, MN, to M. Joyce Morgan, captain RAMC.

PARNEY—TERRY.—On Aug. 20, in London, Fred Schlenker Parney, lieut-colonel RCAMC, to Grace Terry.

DEATHS

CAPES.—On Aug. 27, at Harrogate, Robert Capes, MRCS, formerly of Denmark Hill, London.

EAMES.—On Aug. 24, at Wrecclesham, Surrey, Edward Thomas Philip Eames, surgeon-captain RN retd., aged 74.

FREMANTLE.—On Aug. 26, at Bedwell Park, Hatfield, Sir Francis Edward Fremantle, OBE, M CH, DM OXFD, FRCS, FRCP, MP, DL, aged 71.

PRICE-JONES.—On Aug. 27, at Radlett, Herts, Cecil Price-Jones MB LOND., aged 79.

The fact that goods made of raw materi
to war conditions are advertised in this
as an indication that they are necessarily available for export.

MASS ASPHYXIA

MEDICAL ASPECTS OF THE TUBE SHELTER DISASTER

KEITH SIMPSON, M D LOND
ASSISTANT LECTURER IN FORENSIC MEDICINE, GUY'S HOSPITAL

DURING the evening of March 3, 1943, an alert was sounded in the central London area No enemy action had as yet taken place when people began to arrive in large numbers at a tube shelter, and although, some 5 minutes later, several hundred were congregated at the single entrance and passing down the first flight of stairs "*there was no crowding and the people were moving* quite freely coming down" (according to a witness who stood facing them on the landing of the second flight of stairs and had an uninterrupted view) in an orderly manner"[1] There was however a steady thrust from behind which may have pressed on those in front who

10 ft 3 in wide leading to the booking hall A 57 step escalator led out of this to the rail level There was no lack of accommodation, shelter being provided for 10,000 people, including 5000 in bunks Only some 2000 were then in the shelter, and those using it knew that its accommodation had not on any occasion been taxed, there would be room for all

About ten minutes after the alert signal there was a loud bang According to two witnesses still outside the shelter, "there was a crush at the entrance" but "no panic or stampede" Indeed the people then at the entrance were either "carried inside by the people pushing behind" or "just stuck" "There was no movement of the people in front" and "it seemed as if they had been blocked by something" They had indeed, for a tragic little incident had occurred on the first flight of stairs "The crowd was coming down still orderly" according to the first witness quoted, the man *on the second* landing, when he saw "a woman, who was holding a little girl by the hand, fall down As she did so she sort of pulled the child with her and they both fell on to the bottom step" As soon as she and the
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There was a lot of screaming
hen impossible for any person
to extricate
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people from

Wardens could not pull anyone out until the pressure of those who stood behind on the stairs had been relieved One of these said in evidence that she, with her children, "was pushed on top of them," and other people came forward on top of her Another said, "The pressure was very heavy and we were unable to move as much as a finger No person could move either backwards or forwards"

A police constable in plain clothes who was taking his family into the shelter, realised the impasse and had to climb over the mass of entangled and tightly compressed people to reach the landing He said, "I realised I could not do anything myself so I climbed back over the people
as hurriedly summoned,
tes, the pressure from
as were pulled by main
Further messages for
assistance arrived at the local police stations, and within 15 minutes of the incident occurring several groups of police officers were already at work A senior officer spoke of "at least 200 people piled in a tightly wedged heap on the lower half of the first flight of stone steps leading from street level" For the next hour rescue work proceeded tediously, the conditions impeding rapid divisional police inspector still had to "scramble over the pile of trapped persons" to reach the bottom of the first flight *of stairs All casualties had been cleared* within 3 hours of the incident In addition to wardens, a chief inspector of police, 2 subdivisional, one station and 2 other inspectors, 6 sergeants and 60 constables were hard at work during this period The ventilation of the stairway remained adequate throughout

In all 161 persons were dead when extricated, and a further 12 died after admission to local hospitals Of these 173 who died, 28 were men, 83 women, and 62 children under the age of sixteen, 43 other persons who were admitted as inpatients to the local hospitals made complete recoveries and were discharged In addition a large number received minor attention but were not detained

A subdivisional inspector describing the extrication of victims said, "Almost the last person removed from the bottom was a girl of about seven years She stood up and walked to the first aid post unaided It made no difference what position they occupied in the pile whether people were living or dead Some of the top ones were obviously dead and some at the bottom were living" No fractures were found, and the patients admitted to hospital showed in general only soft crushing injuries of varying weight and surface abrasions A group of cases which developed the crush syndrome with myohæmoglobinuria, as described in this country by Bywaters, were studied by him during their convalescence Independent observation of a similar change was made at the first autopsy in a subject aged eighteen years, and *material was submitted to Bywaters from this case*

The entire group of deaths were reported to the coroner for the district, and on his instructions four selected autopsies were made, the details of these are set out below A public inquest was held, and the jury returned verdicts of accidental death in accordance with the *medical evidence*

This paper has been published for two reasons The first is that accidents of this kind are extremely rare, and scientific observations even rarer—indeed, this is the first to be recorded in detail The second is that a great deal of sceptical interest was shown in the opinion expressed *at the* inquest, *after evidence of the autopsy* findings, that death "could have occurred very quickly, perhaps within 30 seconds of being crushed" The factors causing sudden death in the early stages of asphyxial events are but little recognised The circumstances are usually accidental or criminal in character and *not therefore commonly* experienced except in forensic medical practice They certainly have no relation to everyday experience in holding one's breath, and relatively little *to* quiet physiological experiment

AUTOPSY FINDINGS

CASE 1—Girl aged 4 years Extricated dead Autopsy 42 hours after death A healthy subject of good physique, 3 ft in height
externally, were
and crushing, cau
was borne by the
ample evidence that, at the time, the body was being bent in an acute bow backwards, in violent hyperextension (see below) Deep asphyxial discoloration of the skin was present in the head and neck, the entire r arm, the extremity of the l arm, and appreciably less in the lower trunk and legs Clothing pressure marks were well defined over the l shoulder and chest *and* accompanied by a *broad area of bruising over* the l front chest—some 3 in by 2 in Abrasions were present over the chin, ground downwards and to the r for 1½ in, in keeping with a booted foot pressing and sliding The neck had thus been bent backwards sufficiently to stretch and tear the prevertebral ligaments, and even more stretching was *evident in the mid trunk region, hæmatomata beginning to* develop in the prevertebral tissues Apart from slight surface bruising of the l lung and faint bruising of the front wall of the l ventricle—both from pinning and crushing of the chest—together with a local bruise to the l side of the larynx 1 in across, no other material injury was found These sites of *bruising were, however regarded as vital situations, capable of* far reaching effects No muscle changes were found

CASE 2—Boy aged 7 years Extricated dead Autopsy 60 hours after death A healthy subject of good physique, 4 ft. 1½ in. in height. There was intense cyanosis and congestion of the upper half of the trunk, the head and neck and both forearms and hands, the r. rather more than the l. Heavy pressure marks were present across the entire face, the front of the chest and the upper part of the abdomen. Glancing abrasions were present across the r. chin, to the l. thumb, to the first finger knuckle, and for 4 in. down the r. shin. Three small abrasions, one an inch and two ½ in. across, were present on the l. calf, and spot abrasions were present on both knee-caps. There were no marks on the back and no muscle crushings. Internal examination revealed intense asphyxial changes consequent on compression of the trunk, emptying under pressure of the stomach, and inhalation of vomit. Two small splits in the cardiac mucosa adjacent to the cardiac orifice gave evidence of increased intragastric pressure. The quantity of mixed vegetable food present had clearly not been excessive. No muscle changes were found.

CASE 3.—Girl aged 2½ years. Extricated dead. Autopsy 60 hours after death. A healthy subject of good physique 3 ft. 2 in. in height. This case, sister to case 2, showed very similar changes. There was similarly intense asphyxial congestion and cyanosis in the head and neck, across the shoulders, in both upper arms and wrists and hands, more marked on the l. than the r. These colour changes were relieved by heavy clothing pressure marks across the l. side of the trunk from the root of the neck to the hip region. There were more localised pressure marks with surface abrasions over the l. cheek, down the l. side of the mouth, and on the l. side of the chin. A further area of local bruising lay at the centre of the l. groin. None of these was heavy. Two spot bruises lay on the inner aspect of the r. thigh. Internal examination gave evidence of heavy compression of the chest and the abdomen, there being slight surface bruising of the heart muscle over the front wall of the l. ventricle, but no bruising of the lung. Asphyxial changes had followed the inhalation of vomit, which, as in case 2 had passed deep into the air-passages; it was not merely impacted at the glottis. No pressure splits were present in the stomach in this case, although it contained the same moderate quantity of food. No muscle changes were found.

CASE 4.—Boy aged 18 years. Extricated alive 2½ hr. after the start of the incident; admitted to the London Hospital about 5 min. later; died 3½ hr. after start of incident. Subjected to mass compression for 2–2½ hr. A healthy subject of very strong physique, 5 ft. 4 in. in height. Particularly heavy and sustaining pinning pressure was evident across the l. side of the trunk from shoulder to hip region, and even heavier pressure was evident across the l. thigh. Heavy clothing pressure marks extended from the l. mid-chest across the l. abdomen to the l. forearm, and reached down the l. upper leg. Intense asphyxial congestion with many petechial hæmorrhages had become developed over the scalp, head and neck, causing bleeding from the r. ear, and over the shoulders. Glancing abrasions were present over the back of the l. forearm and wrist, and sustained direct pressure abrasions were present on the l. brow and the r. upper and lower lips, the latter crushed and bleeding slightly. Evidence of the weight of pressure on the l. trunk was given principally by the stomach and intestines. These had already developed a traumatic paralytic dilatation. The stomach measured 10 in. by 5½ in. in its principal dimensions, though containing only some 2–3 oz. of fluid; the small intestines had become correspondingly dilated. No bony injuries were present. The grave asphyxial changes already manifest from external examination were even more pronounced in certain internal organs, petechial hæmorrhages being found in the lung, heart and voluntary muscle, fascia and brain. The ventricular fluids were tinged with blood from subependymal petechiæ of the same kind.

Remarkable ischæmic necroses of muscle were present in both thigh flexor groups. Affected muscle was a pale walnut-brown, swollen, over-moist but not watery, flecked with occasional muscular and fascial hæmorrhages, and merging with surrounding muscle through zones of incomplete necrosis which tended to confuse its precise outline. The conditions found were identical with the muscle necroses seen in war injuries, where the patient has been pinned down by beams and masonry, accompanied by myohæmoglobinæmia and myohæmoglobinuria, by urinary suppression and sometimes death, with renal changes as described by Bywaters and Dible (1942). The kidneys were retained together with portions of muscle and referred to Bywaters for examination, although it was felt that too little time had elapsed for renal changes to become established; no such changes were in fact seen.

DISCUSSION

The cause of death in these cases, although expressed generally as asphyxia due to suffocation by compression in a crowd, was clearly complex. Asphyxia is by no means one of the simple problems in medicine. The word itself, derived from the Greek a-sphuxis, means pulseless—not, as is popularly supposed, prevented from breathing. It seems likely that the Greeks were closer to the truth, for their word is pregnant with a meaning which our own adopted interpretation has lost. Emotional, reflex neurogenic, local cardiac and more general tissue chemical changes, direct compression of the chest or abdomen or constriction of the neck, concussional head injuries and inhalation of vomit inhalation may all be operating in groups or together. Many of these are capable of precipitating death within a few seconds, yet except in forensic practice they often pass unrecognised. Cases 1, 2 and 3, extricated dead, showed changes quite out of keeping with prolonged asphyxia, and since the precise factors operating in each case cannot be detailed it may be more helpful to discuss the causation of death in criminal manual strangulation where closely parallel factors operate.

1. If the victim is frail and highly emotional she may die "of fright," from arrest of respiration and the heart beat, even before she is touched. Any forensic expert will have in his records a group of cases where death has occurred from the emotional disturbance of seeing approaching death—even of seeing danger or hearing bad news. A victim may die even of "anticipating asphyxia," and within a matter of seconds only, sufficient for a mere fluttering arrhythmia, then collapse and death.

2. If you select a vital part of the vagus sheath line—best of all if the thumb is placed on the carotid sinus—you may, the moment you exert pressure, induce a classical vasovagal inhibition, a carotid sinus reflex arrest of respiration and circulation. We are beginning to realise how commonly such a mode of death ensues during the preliminaries of an asphyxial event. Impaction of food at the glottis, or water in drowning, ju-jitsu garrotting or strangling, smart blows on the neck, even it is suggested a brisk current of cold air, are all likely to stimulate this or other receptive ends of this dangerous reflex. Gardner (1942) has recently discussed a group of such cases. Vomiting may result from asphyxia and merely constitute an incident in the course of such a death; this is likely to be forgotten in dealing with infant deaths. There may, on the contrary, be good evidence at autopsy that the inhalation of vomit has contributed materially to death, even where no asphyxial changes have developed. The impaction of food even in the smallest fragments (Moritz 1942) may precipitate death from reflex vagal inhibition, and death then follows so rapidly as to be virtually instantaneous. Case 1 showed a local bruise of the left side of the neck over the larynx and booted foot abrasions crushed down from the chin across the neck, the neck being violently hyperextended. Reflex vagal inhibition might well follow and cause death from these receptive injuries alone. Cases 2 and 3 had inhaled vomit, and although not classically impacted at the glottis this also was clearly capable of causing death without prolonged asphyxia; the absence of such changes form part of the basis for the view that death had taken place quickly. It should also be remembered that bending alone may cause regurgitation of food and initiate such an event.

3. Local biochemical changes in the heart muscle ensue with great rapidity in asphyxia, and their effects on its contractility and conductivity must be most significant in relation to death. At asphyxial arrest in [illegible], according to Chang (1938), "the rabbit's heart has lost 75% of its phosphagen, 90% of its glycogen, and 75% of its adenosine triphosphate." The fall in phosphagen is deeper than that in glycogen which is itself about twice as deep as the fall in pyrophosphate. In a minute the phosphagen may fall to a little over 60% of the initial value. and in two minutes as low as 30%. In the same period glycogen may fall to 80% and 60% of its initial value. It appears that phosphagen constitutes the immediate source of energy for the contraction of heart muscle. Asphyxia produced mechanical failure in about two minutes, "a significant impairment of myocardial

contraction appearing after 30 seconds to 1 minute of ischæmia." Asphyxia has also been shown by several workers to result in a rapid disappearance of the P-wave, ventricular automatism, and an electrocardiogram consisting of R-waves only.

4. More general changes in blood chemistry of material significance appear with alarming rapidity. "Asphyxial conditions raised the serum potassium from 12 mg. per cent. to 38 mg. in 4 to 5 minutes" (Patterson 1942). "The blood serum of these animals" (cats) "was subject to large and rapid variations of K under apparently physiological conditions" (Cattel and Civin 1938). An even more important result of oxygen starvation is seen in the brain and spinal-cord tissues, whose vulnerability to anoxia has been reviewed by Sugar and Gerard (1938)
The time required
after the beginning of
between 10 sec. and
rtical white matter or
medullary tissues were concerned. Putnam (1937) has suggested that this depends on an inherent difference in parenchymatous sensibility rather than on local differences in blood-supply—as might seem reasonable. According to van Harreveld (1930), there exists in the spinal cord of the cat a centre which depresses or inhibits its reflex excitability and which is less resistant to asphyxia than those invol
function. So the
increases with asphy
likely to apply to case 4 in particular, but certainly contributed to the causation of death where any material degree of asphyxia developed.

5. If the victim is knelt on the pressure exerted on the intestines or their mesenterics may produce an arrest of respiratory rhythm and a fall in blood-pressure (Crowley 1942). Crushing pressure on the chest, especially if involving the heart—as was evident in cases 1 and 3, so much more likely in a young subject with an elastic compressible thoracic cage—may do precisely the same, or arrest both respiratory and circulatory rhythm (Moritz and Atkins 1938). Case 4 showed grave thoracic and abdominal crushing but survived to show equally serious secondary changes resulting from these injuries.

6. Where the head is beaten against some surface further ill effects may follow. After delays as short as 1–2 min. after a blow, embarrassment or failure of respiration may follow from contusional or postcontusional œdema of the bulbar centres (Denny-Brown and Russell 1941).

7. A similar effect may follow increasing—progressively stronger or heavier—compression of the neck. Extreme congestion in the head above this level may cause a shower of small hæmorrhages both in the skin and in the deeper tissues such as the brain substance or its membranes. These were noted in case 4. Their effects will be much the same as those developing from contusion. Pressure sufficient, and sufficiently accurately located, to occlude both carotid arteries and cause immediate and continued cerebral anæmia seems to be rare in forensic practice.

* * *

Danger to life clearly ensues within seconds of the start of events. It was not merely out of sympathy with the relatives or for political reasons that the opinion was expressed that death "could have occurred very quickly, perhaps within 30 seconds of being crushed." We should do well to remember the time factor in asphyxia
when emotional, vagal, ca
minal compression, inhaled
less important factors are
seconds are available to save life. This shelter disaster was no cool physiological experiment. *Factors danger-*
oughout
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the last
up and
expression of the factors involved in the causation of death during asphyxial events. It also provides a solid basis for opinions on the time factor in criminal forensic practice.

SUMMARY

An account of the circumstances of the recent tube shelter disaster is set out, and the autopsy findings in four selected cases are described in detail.

The mode of death is discussed by reference to the causation of death in asphyxial events in general, more particularly as encountered in criminal deaths from asphyxia because *it is felt that the rapidity with which a* fatal result may ensue is little recognised. The factors which may contribute to rapid death are given a physiological basis and their forensic importance is stressed.

I am grateful to the coroner to the district concerned for access to the depositions at the inquest. For reasons of security all material names and times have been omitted as well as any controversial matter which might prejudice civil proceedings. I have had advice on physiological points from Mr. W. R. Spurrell and have discussed the forensic interpretations with Dr. Eric Biddle, Dr. F. E. Camps, Dr. Eric Gardner and Dr. R. D. Teare.

REFERENCES

. 111.
. 3.

GAS GANGRENE

ACTIVE IMMUNISATION BY MEANS OF CONCENTRATED TOXOIDS*

M. ROBERTSON
M A, D SC GLASG

J. KEPPIE
B SC EDIN, M R C V S †

(From the Lister Institute and Institute of Animal Pathology, Cambridge)

organisms causing gas
welchii and *Cl. septicum,*
involved the infection of

beginning of the war. This is now so well known that it need not be reconsidered.

Previous workers, including Kolmer (1941) Penfold & Tolhurst (1941) and Stewart (1942) have shown that some
be obtained against gas-gangrene
iting factor is the production of a
Stewart on *Cl. welchii* is the most
and our results are in substantial agreement with her conclusions.

The toxoids used
Knight, D SC, Mr. W.
Herbert, PH D, who
centrated and partially purified antigens. They were in each case made from a single strain of high toxigenic capacity. The organisms used for the infections were derived from strains other than those used in making the toxoids, except in the case of *Cl. welchii* where the homologous organism was used together with another *pathogenic strain. The animals* received an initial dose, followed after an interval varying between 10 days and 3 weeks by a second dose; this constituted the primary immunisation.

The duration and value of this was explored in some of the animals. Others received a third dose after an interval of about 11 weeks. This additional dose, given at a period when the antitoxin content of the blood was found to have dropped considerably, caused a marked

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* *This work has been carried out on behalf of the Medical Research Council's subcommittee on anaerobic wound infections.*

† In receipt of a grant from the Agricultural Research Council.

TABLE I—PROTECTION AGAINST *Cl. œdematiens* AND *Cl. welchii* INFECTIONS IN ACTIVELY IMMUNISED GUINEAPIGS

Organism	Expt.	Immunisation with toxoid				Infection		Survivors	
		Two primary doses		Secondary dose		Time after last dose	Level of attack	Immunised	Controls
		Total Lf	Interval	Interval	Lf				
Cl. œdematiens	1	20	3 wks.	..	..	8 wks.	1000–5000	4/5	..
							100– 500	6/6	..
Washed and heated spores with $CaCl_2$							10– 50	..	0/6
	2	30	3 wks.	..	..	20 wks.	100	7/7	1/5
Strains: Jolly, Domange	3	30	3 wks.	14 wks.	10	6 wks.	1000	7/7	0/5
Cl. welchii	4	40	3 wks.	..	..	12 days	1000–20,000	17/17	
							1– 2000		2/19
Washed vegetative bacilli with $CaCl_2$	5	25	3 wks.	..	..	8 wks.	20,000	2/6	0/6
Strains: S107, SR12							1000	6/7	0/5
							100	6/6	0/6

rise in the titre and inaugurated the secondary immunity which was also tested by exposure to infection.

It is appreciated that further study of the optimal amounts and the spacing of the immunising doses might further improve the results. Some measurements of the titres produced in the blood of the animals were made. The number of these estimations is small, and while they are of interest as indications of the corresponding titres of circulating antibody found at various levels of resistance, there has been no attempt to make an exhaustive examination of this aspect of the response.

Measurements of circulating antitoxin were not made in the case of *Cl. œdematiens.*

The egg-turbidimetric method (van Heyningen 1941) was used for the majority of the estimations of *Cl. welchii* antitoxin. This method has its limitations with sera containing less than 1 unit per c.cm. owing to interference by the amount of serum protein present. Miss M. G. Macfarlane, PH D, therefore kindly obtained the lower values by the lecithinase method (Macfarlane & Knight 1941) which is not affected by the serum proteins. We are grateful to Dr. M. M. Barratt for determining the antitoxin titres in the case of *Cl. septicum.*

The immunising doses are expressed in Lf values.

METHODS OF INFECTION

The method of infection in the case of *Cl. œdematiens* and *Cl. septicum* was the intramuscular injection of 0·25 c.cm. of a washed and heated spore suspension in distilled water to which 0·25 c.cm. of 5% $CaCl_2$ solution had been added before inoculation. A sufficiently rich yield of spores of *Cl. septicum* was obtained by growing strain Pasteur III on Dorset egg medium (Henderson 1940) and the more difficult task of obtaining a rich suspension of spores of *Cl. œdematiens* was achieved by the use of a combination of coli-fermented broth with Dorset egg slopes (Bliss, Long & Smith 1941). The stock spore suspension was of the density of Brown no. 8 tube, and serial dilutions were prepared from it for each experiment.

With *Cl. welchii* a four-hour culture grown on serum-peptone water with beef juice and 0·45% glucose (Robertson & Keppie 1941) was washed in 1·0% peptone water and diluted to form a suspension of a known opacity (No. 5) measured by the Brown opacity tubes. This was diluted in a descending series in peptone water to twice the desired concentration. The sterile calcium chloride solution in distilled water was added immediately before intramuscular injection. These processes were carried out as rapidly as possible. A rapid technique with the minimum of delay between the interruption of growth and the inoculation of the bacteria is important if regular results are to be obtained. In all three cases animals were injected with a range of multiples of what was shown to be one certain killing dose from the titration within the experiment. This is a valuable analysis of the severity of the test and was carried out on every occasion.

While it is recognised that multiples of the lethal dose of living organisms may be an erroneous conception, it is important to push the numbers of organisms up as high as is reasonably possible to show the point at which resistance breaks down.

RESULTS

The results are set out in tables and in a selection of illustrative protocols chosen from the many different experiments made.

Cl. œdematiens.—The protection with *œdematiens* toxoid (experiments 1, 2 and 3, table I) appears to be extremely effective, the immunised animals surviving 100 to 5000 times the amount found to be one killing dose from parallel tests in unimmunised controls.

The protection shown in expts. 2 and 3, table I, wa very good but did not reveal any difference between those with a primary immunity and those which had received a further stimulating dose. So an attempt was made to break down the resistance in the 14 animal which had withstood the infection in this test. They had shown no lesions and it seemed reasonable to suppose that the circulating antitoxin would not have increased in response to the aborted infection. These animals were therefore exposed 6 days later to a second infection with 10,000 times a lethal attack and they again resisted without lesions, while all the controls (8/8) died.

TABLE II—EFFECT OF A STIMULATING DOSE OF *Cl. uelchi* TOXOID ON THE RESISTANCE TO ATTACK

Level of attack in killing doses	Survivors: immunised		Survivors: controls
	2 primary doses	Primary + secondary doses	
10,000–200,000	8/9 Moderate lesions. Gas gangrene arrested	10/10 No lesions	0/10
100–1000	9/10 Moderate lesions. Gas gangrene arrested	..	0/10
1–10	..	..	0/6

Infection: *Cl. uelchii,* S107 washed vegetative bacilli.
Immunisation:
Primary: 2 doses total 30 Lf 3 weeks apart. Tested 20 weeks later: 0·2 antitoxin unit per c.cm. in blood.
Secondary: 10 Lf at 11 weeks. Tested 9 weeks later: 2·5–3·0 antitoxin units per c.cm. in blood.

This experiment also failed to discover any distinction between the resistance of those animals which had only two doses of antigen (expt. 2) and those which had had in addition a third dose after a long interval (expt. 3). It is remarkable that the animals had a solid resistance 5 months after the primary immunisation, but it should not be concluded that a third dose would not be useful in man. At suitable periods, the animals were bled in order that their serum might be examined for agglutinins. The results were negative, neither somatic nor flagellar agglutinins being demonstrated.

Cl. welchii.—The protection given by the *welchii* toxoid (expt. 4, table I) is also good but expt. 5 indicates that after a lapse of time the degree of protection against the highest levels of attack tends to decrease compared with animals tested at the height of the primary immunity. Further experiments on the value of a stimulating dose in increasing the resistance are shown in table II.

Though the investigation of the optimal antitoxin response in relation to the size and spacing of the doses of toxoid is outside the aim of this work, some indication of the correlation between the level of circulating antitoxin and the level of resistance to graded attacks was obtained.

Example A.—After a primary immunisation of three doses (total Lf 40) at three weeks' interval, the antitoxin titre (egg turbidimetric test) at 2, 4 and 11 weeks respectively after the third dose, was approximately 3·5, 2·0 and 1·5 units per c.cm

At 11 weeks a stimulating dose of 10 Lf of toxoid was given which raised the titre to 8 units at 8 days, a level of 8 to 10 units being maintained for 4 weeks.

Example B.—After a primary immunisation of 30 Lf in two doses at three weeks' interval, the titres at 2, 4, 11 and 20 weeks respectively after the last dose were 3, 2 and 1 units per c.cm. (egg turbidimetric test) and 0·2 unit (lecithinase test). *A stimulating dose of 10 Lf given at 11 weeks raised* the titre to 7·0 units in 8 days, with a subsequent fall to 1–3 units in the succeeding 8 weeks. Twenty-three weeks after the stimulating dose, the titre of these animals was between 0·6 and 0·9 unit per c.cm.

After this degree of immunisation, an antitoxin titre of 0·2 unit/c.cm. circulating in the blood of a guineapig appears to correspond to a substantial degree of protection (table II) while with titres of about 2·5 to 3 units the animals were completely resistant to very high levels of attack. The data set out in this experiment (table II) were added to in a later test involving six animals which were immunised in this way with a stimulating dose at 11 weeks but were then retained for 23 weeks and exposed to 1000 times a lethal attack of living organisms. Five out of the six resisted completely without lesions of any kind being produced while one died of gas gangrene. Their titres as recorded above ranged about this time from 0·6 to 0·9 unit. These animals had been under experiment for 9 months and the one death is either a case of an animal failing to react as well as the others or is due to some contributory cause not revealed at the post-mortem examination. The enhancing effect on the antitoxin titre of a local infection in protected animals was examined. A group of animals was exposed *to infection* 8 *weeks after a* primary immunisation when their antitoxin titre was 1 to 2 units per c.cm. and the survivors had local lesions of varying degree which regressed.

The titres of the resisting animals were: at 3 days after infection, 1 to 2 units; at 5 days, 1 to 2 units; at 13 days, 2 to 5 units. The rise in titre at 13 days is significant but there is a lag of at least 5 days in the antitoxin response to the stimulus of the infection.

The effect of a stimulating dose on the titres of animals which had been given a primary immunity by the injection of *Cl. welchii* toxoid was also observed in 8 rabbits. This injection after 11 to 14 weeks produced a considerable increase in the titre above the moderate primary response but the rise did not begin in any case till the 3rd day and was not very substantial until the 5th day.

Cl. septicum.—The conditions for protection with *septicum* toxoid seemed to differ somewhat from those observed with *œdematiens* and *welchii.* In the preliminary experiments carried out with doses comparable in terms of Lf content of antigen with those used successfully with the other toxoids,[‡] no resistance whatsoever was shown against 10 times a lethal attack (expt. 1, table III).

The Lf of the toxoid dose for a satisfactory primary *resistance (expt. 2) was found to be* 150 Lf given in two doses 3 weeks apart. Animals immunised in this way and kept for 11 weeks had titres of less than 1 unit per c.cm. and showed a considerably decreased resistance to infection (expt. 3a). If a stimulating dose (50 Lf) was given at 10 weeks after the primary immunisation, the titre at the peak of the response (10 days) was 3 units and the animals were solidly resistant to 1000–5000 times a certain killing dose of live spores (expt. 3b, table III). This shows that in spite of the invasive character of *Cl. septicum* an animal can be protected against a very high level of attack on what must be primarily and probably entirely an antitoxic basis.

Expt. 4, table III, shows the result of a test 9 weeks after the stimulating dose. The antitoxin titre of the pooled sera was about 1 unit/per c.cm. There were only 8 animals available and they were exposed to the same high level of attack (1000–5000 killing doses) as that used in 3a and 3b. It will be seen that 5 out of 8 were completely protected; this is in sharp contrast with the result in 3a, where at a comparable interval after the last dose of toxoid in a primary immunisation the animals all succumbed to this attack.

It should be observed that while the value of the protection in the stimulated animals has declined when compared with the test of this group at 10 days, which is the peak of the secondary immunity, the degree of resistance is still very substantial against what must be considered a very severe test.

The falling-off in the resistance with time has not been so well explored because of practical considerations and we would point out that while the theoretical basis seems clearly established the dosage and the assessment of the adequate level of antitoxin necessary for continued protection should probably be based on a higher circulating titre than that suggested in these experiments.

As was the case with *œdematiens* toxoid, agglutination tests for bacterial antibodies were again negative when the sera from the animals immunised with *septicum* toxoid were examined.

DISCUSSION AND CONCLUSIONS

The toxoids used for immunisation in these experiments were in all cases derived from the supernatant fluid of cultures, the bacteria being discarded. They are toxoids in the strict sense of the word. In *Cl. welchii*, for example, it is the alpha (lethal) toxin that is titrated and while other elements may no doubt be present this is primarily an α antitoxin immunisation. Any soluble antibacterial elements present must be minimal in quantity and can exercise very little, if any, effect. This is borne out by the experimental finding that the sera from animals immunised with *Cl. œdematiens* and *Cl. septicum* toxoid contained no agglutinins [illegible] organisms beyond the necrotic area of the inoculation depends upon the damage done to the tissues by the *toxin and on the paralysis of the leucocytic action* which it sets up.

It has been shown here in *Cl. welchii* and *septicum*—and it applies no doubt to *œdematiens* also—that this type of protection depends on an adequate amount of antitoxin circulating in the blood and only so long as it is

TABLE III—ACTIVE IMMUNISATION AGAINST *Cl. septicum*

Organism	Expt.	Immunisation with toxoid: Two primary doses: Total Lf	Immunisation with toxoid: Two primary doses: Interval	Immunisation with toxoid: Secondary dose: Interval	Immunisation with toxoid: Secondary dose: Lf	Infection: Time after last dose	Infection: Level of attack in killing doses	Antitoxin in blood of animals units /c.cm.	Survivors: Immunised	Survivors: Controls
	1	40	11 days	..	..	24 days	10	..	0/6	0/4
	2	150	3 wks.	..	..	2 wks.	1000	2·0	4/5	0/5
Cl. septicum		150	3 wks.	..	..	2 wks.	100	2·0	5/5	0/5
Washed and heated spores with CaCl₂	3a	150	3 wks.	..	..	11 wks.	1000–5000	< 1·0	0/6	0/3
							100	< 1·0	3/4	0/5
Strain: Pasteur III	3b	150	3 wks.	10 wks.	50	10 days	1000–5000	3·0	8/8	0/3
	4	150	3 wks.	10 wks.	50	9 wks.	1000–5000	< 1·0 – > 1·0	5/8	0/3

[‡] It [illegible]

present is the animal protected. If this condition is achieved, very massive attacks by the living organisms are resisted.

It is important that this should be realised. It is also clear that the enhancing effect on the titre of a primarily immunised animal, whose immune-body capacity has been trained, does not come into play—whether the antigen is presented as toxin in the course of an infection or as a further dose of toxoid—for a period of between 3 and 10 days. This time-lag must be borne in mind in applying these data to man; owing to the rapid onset of gas gangrene, the essential condition for protection is that antitoxin should already be circulating in the blood at the time of exposure to infection.

SUMMARY

Small doses of toxoid protected guineapigs against the three organisms most frequently causing gas gangrene—*Cl. welchii*, *Cl. œdematiens* and *Cl. septicum*. Protection depends on the presence of an adequate amount of antitoxin in the circulating blood of the animal.

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FACTORS AFFECTING THE RESPONSE OF IMMUNISED GUINEAPIGS TO ANTIGENIC STIMULUS

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WHEN a dose of specific antigen is given to an animal which has been actively immunised many months or even years before, and in which the circulating antibody has declined to a low level or may be no longer detectable, there is almost always a rise in the antibody content of the blood. After a delay of 3–5 days the antibody begins to increase, and it reaches a maximum concentration about 10 days after the reinjection of antigen.

The object of our experiments was to see whether this customary response to antigenic stimulus occurred when the animals were kept under adverse and abnormal conditions, including restriction of diet, exposure to cold, and non-specific infection.

About 100 guineapigs, all bred at the Medical Research Council's farm laboratories, were available. They had been used for studying the immunity produced by the diphtheria prophylactic alum-precipitated toxoid (APT). Each had received an injection of APT equivalent to 1 flocculation unit, and 4 weeks later a second injection of the same amount. The antitoxin content of the serum was determined 10 days after the second injection and again four times at intervals of about a month, the last sample being taken 8 months after the first injection of antigen. The rate of decline of antitoxin in the circulation was thus determined for each animal, and with few exceptions it followed the normal course: the decline was rapid during the first month after the first bleeding; it was small during the next month; and there was little change during the rest of the eight-month period.

All the guineapigs used in these experiments had behaved in this general way, although the maximum antitoxin level recorded 10 days after the second injection, and the level maintained in the later months, was higher in some than in other.

During these eight months the animals remained well. At the beginning of the immunisation they weighed from [illegible] to 350 grammes, and their weight increased to 500–600 g. or more; apart from occasional fatalities following heart puncture there were no deaths among them.

EXPERIMENT I

A group of 42 animals was divided into four smaller groups (10, 10, 10 and 12) in such a way that each group contained some with a relatively large, some with an intermediate, and some with a relatively small amount of circulating antitoxin. For eight months they had lived under the same favourable conditions.

They were housed in the same room, which was light, airy, well ventilated and panel-heated, in cages made entirely of metal. These consisted of a shallow tray-like base, 15 × 20 in., and a cover made of wire 12 in. high which fitted loosely into the tray. Each cage accommodated 4, and occasionally 5 animals, those in one cage always being of the same sex. Sawdust was used for litter and hay was supplied daily. In the morning each animal was given a daily ration of bran (15 g.) and sugar-beet pulp residue (15 g.) made into a mash with water, and about 50 g. of cabbage per guineapig per day was given as the evening feed.

For the purposes of the experiment the four groups were treated as follows:

(*a*) *Controls*.—For 10 guineapigs the living conditions remained as before.

(*b*) *Restricted diet*.—10 were given water, but deprived of food for 48 hours. They were then given the same daily ration of bran and sugar-beet pulp as the control group for an additional 3 days before the injection of antigen, and this diet was continued for the remaining 10 days of the experiment. They were not given hay or cabbage.

(*c*) *Exposure to cold*.—10 were transferred in their cages between 9 and 10 AM to a room with a temperature constantly at – 2° C. to – 4° C., and remained there until 4–5 PM. They were then transferred, in their cages, to the roof of the institute and remained there, in the open, until 9–10 AM next day, when they were taken back to the cold room. This procedure was repeated daily for 3 days before the injection of antigen and during the remaining 10 days of the experiment. The animals of this group received the same diet as the control group. The experiment was carried out in the second half of October, 1942.

(*d*) *Welchii infection*.—12 were injected with a washed culture of *Cl. welchii* type A in the presence of calcium chloride. Contrary to expectation, based on earlier tests, only 2 survived for 10 days. This part of experiment I was accordingly repeated (expts. II and III below). The animals in this group, and those used in the two later experiments, were housed and fed like the controls.

Each animal was injected subcutaneously with the equivalent of 1 flocculation unit of APT, in 1 c.cm. of normal salt solution. At the time this injection was given the animals in group (*b*) had been kept without food for 2 days and on the restricted diet for 3 more days; those in group (*c*) had been exposed as described above for three days, and in those of group (*d*) infection with *Cl. welchii* was well-established after their injection 24 hours before.

The results are summarised in table I. It will be seen that all the surviving animals in all the groups showed an increase in antitoxin content, and it is clear that neither restriction of diet nor exposure to cold had a significant effect on this response.

One point with regard to the design of the experiment, and one with regard to its execution, may be mentioned briefly here.

So that the effects of adversity could be evaluated the dose of antigen had to be such that, in the control group at least, the response should not be maximal, and yet at the same time it must be measurable. That the dose injected was not too small is evident from the fact that in every animal the antitoxin concentration after 10 days was at least twice its original value. That it was not too large is clear because in similar experiments with animals at the same stage of immunisation, a larger dose of antigen was followed by much larger increases in antitoxin concentration. In one such experiment the antitoxin content of pooled serum from 50 similar guineapigs was 40 units per c.cm. That the dose of antigen injected was submaximal is also suggested by the fact that when the original antitoxin was high the increase was relatively small and when the original titre was low the increase was relatively large.

TABLE I—INCREASE OF CIRCULATING ANTITOXIN ON INJECTING ANTIGEN INTO IMMUNISED GUINEAPIGS (*a*) KEPT UNDER NORMAL CONDITIONS, (*b*) GIVEN A RESTRICTED DIET, (*c*) EXPOSED TO COLD, (*d*) INFECTED WITH *Cl. welchii*, TYPE A

(*a*) Normal controls			(*b*) Restricted diet			(*c*) Exposed to cold			(*d*) *Cl. welchii* infection		
AT units/c cm		Increase in AT	AT units/c cm		Increase in AT	AT units/c cm		Increase in AT	AT units/c cm		Increase in AT
Before antigen	10 days after		Before antigen	10 days after		Before antigen	10 days after		Before antigen	10 days after	
1	(1) 2	2 ×	2	(2) 4	2 ×	2	(2) 8	4 ×	0.125	0.25	2 ×
1	(1) 4	4 ×	1	(1) 4	4 ×	0.5	(0.5) 2	4 ×	0.125	4	32 ×
1	(1) 8	8 ×	1	(1) 8	8 ×	0.5	(0.5) 2	4 ×			
0.5	(0.5) 8	16 ×	1	(1) 8	8 ×	0.5	(0.5) 2	4 ×	(10 died within 10 days)		
0.25	(0.5) 2	8 ×	0.5	(1) 2	4 ×	0.5	(1) 4	8 ×			
0.25	(0.125) 4	16 ×	0.5	(0.5) 4	8 ×	0.5	(0.25) 4	8 ×			
0.25	(0.5) 4	16 ×	0.5	(0.5) 4	8 ×	0.5	(0.5) 8	16 ×			
0.25	(1) 4	16 ×	0.25	(0.5) 8	32 ×	0.5	(0.5) 8	16 ×			
0.25	(1) 8	32	0.25	(0.5) 8	32 ×	0.25	(0.5) 4	16 ×			
0.125	(0.125) 4	32 ×	0.25	(0.25) 8	3 ×	0.125	(0.125) 1	8 ×			
Geom mean 0.38	(0.5) 4.29		0.57	(0.7) 5.28		0.47	(0.5) 3.48				

The figures in parentheses indicate antitoxin concentration on *fifth* day after injection of antigen

For the execution of the experiment, the conditions had to be such that the guineapigs, or the great majority of them should survive for 10 days. These conditions were achieved for those on a restricted diet and those exposed to cold, but not in group (*d*) (non-specific infection) in which only 2 out of 12 animals survived till the 10th day after the injection of antigen. It is to be noted however that these 2 which just survived 10 days despite typical signs of gas gangrene, had an increase in antitoxin concentration.

The antitoxin content of the serum of 30 guineapigs was determined on the *fifth* day, as well as on the tenth day, after the injection of antigen. It will be seen (table I) that by the fifth day it had increased in 9, remained unchanged in 19 and decreased in 2. The beginning of the increase does not seem to have been retarded by restriction of diet and only very slightly by cold.

EXPERIMENT II

A small dose of a less virulent culture of *Cl. welchii* type A was injected into 15 of the guineapigs which had been immunised with APT.

The infection was induced by the method described by Armstrong and Rae[1] and used in this laboratory by Evans.[2] After 24 hours they all showed a large plum coloured swelling at the site of inoculation (the muscles of the left thigh). Each of the 15 animals and 11 others which formed a control group was then injected with the equivalent of 1 flocculation unit of APT, all these injections being given subcutaneously on the right side of the middle line and upwards towards the right axilla. In all 15 animals of the infected group the disease progressed, typical gangrene of the thigh muscles developed during the second day, the tissues at the site of inoculation broke down an open wound was produced, and the œdema increased until it reached the level of the diaphragm. In all cases there was extensive tissue damage and 3 animals died before the 10th day. Ten days after the injection of antigen the antitoxin titre of each of the 12 surviving animals of the experimental group and each of the 11 controls was determined. The 12 surviving animals in the infected group were then killed, they all showed extensive lesions typical of *Cl. welchii* infection, the organism being recovered in all cases from the thigh muscles and in 3 from the heart blood.

Table II shows that while the antitoxin response in the experimental group was slightly less than in the control group, all the animals—despite severe illness during the 10 days following injection of the antigen—showed an increase in antitoxin concentration.

EXPERIMENT III

This was carried out in a slightly different way.

A group of 21 animals immunised against diphtheria had been used for testing the protective action of *Cl. welchii* antiserum against a living virulent culture of that organism, the infection being induced as described above. The antiserum had been given three hours before the culture. Four days later it was clear that about half these animals had been fully protected by the antiserum and would almost certainly survive, while the other half exhibited symptoms of gangrene in varying degree.

At this stage all 21 animals were bled and each was given the equivalent of 1 flocculation unit of APT. Ten days later each of the survivors was bled again. All the animals were then killed, and cultures were made from the heart blood and from the muscles at the site of injection. On purely clinical appearances they were divided into two groups—(i) those with signs of gas gangrene, and (ii) those without. Excluding one animal which died during the 10 days of the experiment, *Cl. welchii* was cultivated from the thigh muscles of all the

TABLE II—INCREASE OF CIRCULATING ANTITOXIN ON INJECTING ANTIGEN INTO IMMUNISED GUINEAPIGS (1) KEPT UNDER NORMAL CONDITIONS, (2) INFECTED WITH *Cl. welchii* TYPE A

(1) Normal controls			(2) Infected with *Cl. welchii*		
AT units/c cm		Increase in AT	AT units/c cm		Increase in AT
Before antigen	10 days after		Before antigen	10 days after	
0.5	4	8 ×	0.5	2	4 ×
0.5	8	16 ×	0.5	4	8 ×
0.25	4	16 ×	0.25	4	16 ×
0.25	8	32 ×	0.25	4	16 ×
0.25	8	32 ×	0.25	4	16 ×
0.125	4	32 ×	0.125	4	32 ×
0.125	4	32 ×	0.125	4	32 ×
0.125	4	32 ×	0.05	0.5	10 ×
0.125	8	64 ×	0.05	0.5	10 ×
0.125	8	64 ×	0.05	4	80 ×
0.005	4	800 ×	0.01	4	400 ×
			0.002	4	2000 ×
Geom mean 0.15	5.48		0.08	2.8	

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[1] Armstrong, A. R. and Rae, M. V. *Canad. med. Ass. J.* 1941, 45, 116.

[2] Evans, D. G. *Brit. J. exp. Path.* 1943. In the press.

animals with clinical gangrene (and from the heart blood of one of them) but not from any of the others.

The results in table III agree with those of expt. II. Again the response was slightly less in the infected group, but all except one of the animals showed an increase in antitoxin concentration in spite of an active infection involving considerable tissue damage. It is to be noted that in this experiment the infection had been established for four days before the antigen was given.

TABLE III—INCREASE OF CIRCULATING ANTITOXIN ON INJECTION OF ANTIGEN INTO IMMUNISED GUINEAPIGS: (1) WITHOUT GAS GANGRENE; (2) WITH GAS GANGRENE

(All had been infected with *Cl. welchii*, but group 1 had been protected with antiserum)

(1) No gas gangrene			(2) Developed gas gangrene		
AT units/c.cm.		Increase in AT	AT units/c.cm.		Increase in AT
Before antigen	10 days after		Before antigen	10 days after	
2	8	4 ×	1	2	2 ×
1	2	2 ×	0·5	1	2 ×
1	8	8 ×	0·5	2	4 ×
0·5	2	4 ×	0·5	8	16 ×
0·25	1	4 ×	0·25	0·25	0
0·25	1	4 ×	0·25	0·5	2 ×
0·25	4	16 ×	0·25	1	4 ×
0·125	4	32 ×	0·25	4	16 ×
0·05	1	20 ×	0·125	0·25	2 ×
			0·125	0·5	4 ×
			0·125	4	32 ×
Geom. mean 0·36	2·52	..	0·28	1·21	..

DISCUSSION

It may be argued that the conditions of these experiments were not so severe as they might have been made; but they were at least very different from those to which the animals had been accustomed, and they resembled to some extent those which healthy young adults might experience at the present time. Viewed in retrospect, the results suggest that the exposure to cold might have been longer and perhaps more severe, and that the diet might have been even more restricted, so that the physical condition of the animals would have deteriorated more before the antigen was injected. It is not possible to say whether guineapigs in an extremely emaciated and debilitated state would respond to antigenic stimulus, but the results obtained with those infected with *Cl. welchii* are suggestive; for these animals experienced such adverse conditions as only just permitted survival for 10 days after infection. The choice of this organism was fortunate because it established disease very quickly and this progressed during the 10 days of the experiment. Many of the animals which survived for this time were almost moribund when the final blood sample was taken; all of them had suffered a severe and protracted illness, with large wounds involving extensive tissue damage, during the whole time that the established immunising mechanism was being stimulated; and it is remarkable that the mechanism responded—only slightly less than in the normal healthy controls—in 22 out of 23 animals infected.

As it appeared possible that the results of these experiments might have some bearing on the procedures adopted for the prevention of tetanus in wounded or injured persons, the attempt was made to reproduce conditions somewhat resembling those in which human beings might require tetanus prophylaxis. These procedures vary in different armies, and opinion is still divided as to whether an immunised person who becomes a casualty should be given an injection of toxoid or one of tetanus antitoxin. Active immunisation against tetanus is compulsory in the armed forces of the United States and France, and the American and French authorities argue that, as the immunised casualty may have either an adequate concentration of circulating antitoxin or an established immunising mechanism which can be stimulated into activity either by exposure to natural infection or by the injection of tetanus toxoid, the administration of antitoxin is unnecessary.

The practice of giving toxoid, rather than antitoxin, has been questioned on several grounds. One is that there is a delay of some days before the circulating antitoxin increases; another is that, whereas an increase in antitoxin may be confidently expected to occur under normal conditions, it might be absent or greatly delayed in seriously injured persons, possibly with heavily infected wounds, suffering from shock, or otherwise affected by abnormal adverse conditions. In our experiments the adverse conditions to which the immunised guineapigs were exposed had little or no effect on their response to antigenic stimulus.

SUMMARY

The increase of circulating antitoxin which follows injection of an antigen (diphtheria APT) into immunised guineapigs was but little affected by exposure to cold, restriction of diet, or infection with *Cl. welchii.*

So far as they are applicable, these experiments suggest that, despite the adverse conditions of the battlefield and lowering effect of wounds, injured persons who have previously been immunised against tetanus or other infections may be expected to develop antitoxin in response to an antigenic stimulus.

PERSISTENCE OF TETANUS ANTITOXIN IN MAN

FOLLOWING ACTIVE IMMUNISATION

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THE persistence of antitoxin for long periods after immunisation with tetanus toxoid under different conditions has already been demonstrated (Ramon and Zoeller 1933, Sneath and Kerslake 1935, Bigler and Werner 1941, Peshkin 1941). In this paper a comparison has been made between the persistence of antitoxin in immunised persons who receive a stimulating dose and those who do not.

In July, 1940, a number of the staff of the National Institute for Medical Research, Hampstead, received

TABLE I—TETANUS ANTITOXIN TITRES OF SERA FROM PERSONS RECEIVING TWO DOSES OF TETANUS TOXOID

Antitoxin titre (IU per c.cm.)

Before 1st inoculation	9 weeks after 1st inoculation	After 2nd inoculation	
		4 mos.	28 mos.
< 0·01	< 0·01	0·1–1	0·1–1
< 0·01	< 0·01	0·1–1	0·1–1
< 0·01	0·02–0·1	0·1–1	0·1–1
< 0·01	< 0·01	0·1–1	0·1–1
< 0·01	0·02–0·1	0·1–1	0·02–0·1
< 0·01	—	0·1–1	0·02–0·1
< 0·01	0·01–0·02	0·1–1	0·02–0·1
< 0·01	< 0·01	0·02–0·1	0·01–0·02
< 0·01	0·01–0·02	1–2	0·1–1
< 0·01	0·02–0·1	0·1–1	0·02–0·1
< 0·01	< 0·01	0·02–0·1	0·02–0·1
< 0·01	< 0·01	0·1–1	0·02–0·1
< 0·01	< 0·01	0·1–1	0·02–0·1
< 0·01	0·1–1	1–2	0·1–1
< 0·01	0·01–0·02	0·1–1	0·1–1
< 0·01	0·1–1	0·1–1	0·1–1
Geom. mean: < 0·01	0·02	0·11	0·04

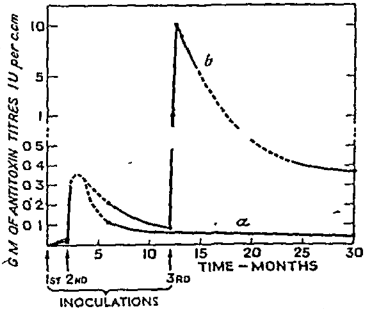
TABLE II—TETANUS ANTITOXIN TITRES OF SERA FROM PERSONS RECEIVING A THIRD DOSE

Antitoxin titre (IU per c.cm.)

Before 1st inoculation	9 weeks after 1st inoculation	After 2nd inoculation		After 3rd inoculation			
		4 mos.	10 mos.	5 days	12 days	30 days	18 mos.
< 0·01	< 0 01	0·02–0·1	0 02–0·1	0 02–0 1	2–5	2–5	0·1–1
< 0 01	0·02–0·1	0·1–1	0·1–1	2–5	10–20	10–20	0 1–1
< 0·01	< 0·01	0 02–0·1	0·02–0·1	0·1–1	2–5	2–5	0·1–1
< 0 01	0·1–1	1–2	0·1–1	2–5	20–50	20–50	1–2
< 0·01	0·1–1	1–2	0·1–1	2–5	20–50	20–50	1–2
< 0 01	—	1–2	0·1–1	5–10	20–50	20–50	1–2
< 0·01	0 02–0·1	1–2	0·1–1	2–5	20–50	20–50	2–5
< 0·01	0·02–0·1	0·1–1	0·1–1	1–2	10–20	5–10	0·1–1
< 0·01	0·1–1	0·1–1	0·1–1	5–10	20–50	20–50	0 1–1
< 0·01	—	0·1–1	0·1–1	2–5	10–20	5–10	1–2
< 0·01	0 02–0·1	1–2	0·1–1	2–5	10–20	10–20	1–2
GM = < 0 01	0·03	0·21	0 08	1·1	10·1	9 0	0·37

GM = Geometric mean.

two doses of tetanus toxoid, each of 1 c.cm., given at an interval of 9 weeks. The content of circulating antitoxin in the sera was determined before and after the first injection and also 4 and 10 months after the second. The effect of a third injection of toxoid, given 10 months [illegible] n 16 persons. [illegible] he subjects, a [illegible] international unit per c.cm. and the third dose resulted in a large and rapid increase (Evans 1941).



Antitoxin titres in the blood of persons receiving (a) two doses, and (b) a third dose.

It was not to be expected that the high levels of antitoxin found 12 days after the third inoculation would be maintained of the tion tl advant be [illegible] lose of [illegible] the antitoxin content of the sera of (a) those who received only two doses of toxoid and (b) those who received the additional dose.

Sera were obtained from 16 persons who had had two [illegible] e. Tables [illegible] e subjects [illegible] c mean for [illegible] f the anti- [illegible] been used

All the sera from [illegible] doses had less than 1 [illegible] none had less than 0· [illegible] Comparing these valu [illegible] after the second inje [illegible] unchanged in 7 of the cas [illegible]

All the sera from the 11 [illegible] dose had more than 0·1 unit, and 6 of them had more than 1 unit. In no case was the antitoxin content of the persons in this group lower than the value obtained 4 months after the second injection; in fact in 4 of the subjects it was even higher.

CONCLUSION

Administration of a third dose of tetanus toxoid increases the concentration of antitoxin in the blood. For 18 months at least, the concentration remains much higher than that resulting from two doses of toxoid.

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TANRET REACTION IN SUBTERTIAN MALARIA

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M D, F R C P E
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The simple Tanret test for quinine in urine, as described in textbooks on tropical medicine, has been widely used to control the administration and ab [illegible] that, properly used, the test has an even greater value than has been generally realised, but that mistaken ideas regarding its interpretation need to be removed.

Properly used the test may explain many apparent [illegible] Its use has suggested [illegible] ine metabolism may play [illegible] about the state of "continued infection" which is recognised as favouring the onset of blackwater fever.

METHODS

We used the technique of the Tanret test described by Manson-Bahr (1940) and confirmed with our own reagent that it gives a positive reaction when quinine is present even in a dilution of 1:200,000.

Reagent.—Two solutions are prepared :—

Solution 1.—Mercuric chloride, 27 g., is dissolved by stirring in 1500 c.cm. of boiling distilled water.

Solution 2.—Potassium iodide, 100 g. is dissolved in 500 c.cm. of cold distilled water.

[illegible] itely, mix solutions [illegible] cold and clear or [illegible] may be cleared with a few drops [illegible] turbidities may be removed by fil [illegible] of urine add a few drops of reagent. If quinine is present in concentrations of 1 in 200,000 or more, turbidity will appear which disappears on heating. If turbidity persists on heating albumin is present. It is then necessary to take a second 10 c.cm. of urine and remove the albumin by precipitation with heat and acetic acid followed by filtration. The albumin-free filtrate should then be cooled and tested with the Tanret reagent for quinine.

Positive reactions are also found in the urines of patients taking plasmoquine but not of those taking other alkaloids in ordinary therapeutic doses.

We applied the test to every specimen of urine passed by 100 consecutive men admitted to hospital with subtertian malaria both during their acute attacks and in convalescence.

Treatment consisted of a week's course of quinine bisulphate in solution, given in three doses of grains 10 daily by mouth (a total of gr. 210 in a week). We never used tablets and took special precautions to prevent evasion of the drug, especially when negative Tanret reactions were found. When that happened, one of us saw the dose taken and made the man speak for a few moments to be sure that he swallowed it. When necessary, we saw urine passed. In no instance did our precautions alter the picture. After the week on gr. 30 a day, the dose was reduced to gr. 10 daily for 3 or 4 days, and then to gr. 5 daily before discharge. Tanret reactions were continued during this period. British troops in the area were under orders to take a daily dose of gr. 5 of quinine on parade as a suppressive of malaria, and it was common practice to increase the dose to gr. 10 for a short period after unusual stress or after an attack of malaria: hence the importance of the reactions during convalescence.

Controls.—53 soldiers in good health were given gr. 5 of quinine in solution by mouth and their urines were examined for Tanret reactions at intervals of 15, 30 and 60 min. after the test dose and then at hourly intervals until a positive reaction was found. A final specimen was examined from each man 24 hours after the test dose.

RESULTS IN ACUTE ATTACKS

Of the 100 soldiers, 88 showed a positive Tanret reaction within 2–3 hours of their first dose of quinine and continued to have strong reactions in all urines passed during their 7 days on gr. 30 a day. All these men became apyrexial in 72 hours at most and recovered uneventfully.

Of the other 12 cases, 7 showed negative reactions in all urines until a dose of intravenous quinine was given. While the Tanret reactions remained negative they were all acutely ill: after the intravenous quinine the Tanret reaction became positive and remained so, even when the same doses of quinine were again given by mouth. Recovery following the intravenous quinine was rapid. The remaining 5 showed occasional positive reactions at irregular intervals. They were not dangerously ill and were not given intravenous quinine but recovery was slow; pyrexia lasted 5 or 6 days and the Tanret reactions during convalescence were unsatisfactory.

Short records of these 12 men are given.

ALL TANRET REACTIONS NEGATIVE

CASE 1.—Aged 37. In West Africa 3/12 year. First attack. Admitted 2nd day of illness. Temperature 104·4° F. Diagnosis on clinical grounds. No vomiting. After gr. 30 of quinine in 24 hours Tanret negative in all urines. T. 103·6° F. Delirious. Quinine, gr. 10, intravenously. T. 98·4° F. in 12 hours. Tanret positive. Progress satisfactory.

CASE 2.—Aged 33. In WA 10/12 year. Admitted 1st day of 8th attack. T. 102° F. Malaria parasites (MT rings) +. In 28 hours quinine, gr. 40, by mouth. No vomiting. Tanret negative. T. 99° F., but very drowsy. Headache severe. MT rings ++. Quinine, gr. 10, intravenously. Tanret positive in 2–3 hours. Recovered. He developed blackwater fever 7 months later. Recovered.

CASE 3.—Aged 39. In WA 12 years. Uncountable previous attacks. Admitted 1st day. T. 102·8° F. Very ill. Complication—acute gonorrhœa. MT rings +. In 3½ days, quinine, gr. 100, by mouth. T. 100° F. Sharply ill. Tanret negative in all urines. No vomiting. Quinine, gr. 10, intravenously. Tanret positive. T. 99° F. for next 3 days and then normal. Good progress.

CASE 4.—Aged 29. In WA 1 3/12 years. Admitted 4th day of 2nd attack. Vomiting before admission. Quinine given before admission: amount unknown. Diagnosis on clinical grounds. T. 101·6° F. Fairly ill. Jaundice developed 3 days after admission, accompanied by vomiting. Tanret reactions negative after gr. 90 of quinine by mouth in 3 days. T. 101° F. Quinine, gr. 10, intravenously. T. 98·4° F. in 6 hours and Tanret positive. Improved. Though jaundice continued (icterus index 80) and nausea persisted, Tanret reactions now remained positive on oral quinine. No further signs or symptoms of malaria. Slow improvement of jaundice.

CASE 5.—Aged 32. In WA 1 7/12 years. Admitted 3rd day of 9th attack. T. 104° F. MT rings ++. Acutely ill. In 2½ days before admission gr. 70 of quinine given by mouth. Tanret reactions negative. No vomiting. Quinine, gr. 10, intravenously. Marked improvement. Tanret positive. Recovered quickly. Six months later developed blackwater fever with anuria: died.

CASE 6.—Aged 40. In WA 8/12 year; 7th attack; admitted 3rd day of illness. Quinine, gr. 70, orally before admission. Tanret reactions negative. Delirious. T. 103° F. No vomiting or other gastro-intestinal symptoms. Parasites not demonstrated, but clinical picture typical of malaria. gr. 10, intravenously. T. 98·4° F. in 8 hours. Tanret positive: remained positive on oral quinine. Rec
uneventful.

CASE 7.—Aged 22. In WA 1 9/12 years; 7th a
Admitted 1st day of illness. MT rings +. T. 101° F.
drowsy. After quinine, gr. 40, by mouth in 28 hours T
reactions still negative and patient still drowsy. T. 1
No vomiting or other gastro-intestinal symptoms. Qu
gr. 10, intravenously. Tanret positive 5 hours late
98° F. in 24 hours. Progress satisfactory. Tanret po
while dose of oral quinine remained at gr. 30 per day
always negative during convalescence on any dose less
gr. 15 by mouth. Discharged on suppressive dose of
of quinine daily in place of previous gr. 5.

TANRET REACTIONS IRREGULARLY POSITIVE

CASE 8.—Aged 27. In WA 8/12 year; 5th attack
quinine, gr. 30, by mouth Tanret reaction positive in
one of every 3–4 specimens of urine. No vomiting
intravenous quinine given. T. 100–101° F. until 6th
Recovery slow. In convalescence gr. 15 quinine by r
necessary for positive Tanret. All reactions negative
gr. 5 and gr. 10.

CASE 9.—Aged 24. In WA 8/12 year; 9th attack.
rings +. Tanret irregularly positive on gr. 30 oral q
daily. No vomiting. T. 99·6–101° F. for 5 days. No
venous quinine given. Recovery slow. In convale
Tanret reactions negative after quinine, gr. 5, but po
after gr. 10, by mouth.

CASE 10.—Aged 27. In WA 1 4/12 year; 8th a
Blackwater fever 6 years before. No vomiting, but T
positive at very irregular intervals only. T. 101° F.
nosis clinical. No intravenous quinine given. Rec
slow. T. 99–100° F. until 5th day. In convalescence T
reactions all negative until dose of quinine raised to
daily.

CASE 11.—Aged 27. In WA 7/12 year; 4th attack.
rings ++. Tanret irregularly positive on gr. 30 of qu
by mouth. After gr. 40 in 28 hours MT rings still
No vomiting. T. 99–100° F. for 6 days. No intrav
quinine given. In convalescence Tanret tests all neg
after gr. 5 or 10 of quinine by mouth, but positive after

CASE 12.—Though this is the most extreme "non-reac
of the present series, 2 similar examples have since
found in a period of 7 months. The history is give
greater detail than the others because of its unusual
illustrative features. Aged 21. In WA 1 year. Has h
attacks, each coming on a month after the previous
Admitted 7th day after last attack with " low fe
and persistent debility. Hb. 70% (Haldane). T. 10
MT rings +. Treatment: gr. 30 of quinine by mouth
for 7 days, followed by gr. 10 daily. (We had not yet b
regular Tanret tests.) Three weeks after admission T. 9
Marked debility. Red cells 3,000,000 per c.mm. Treat
with gr. 30 of quinine daily resumed for 7 days. T
reactions positive at irregular intervals—less than one po
per day. No vomiting or other gastro-intestinal disturb
At the end of course T. 99° F. Red cells 3,200,000 per c
Quinine increased to gr. 45 daily (3 doses of gr. 15) for 5
Slight increase in number of positive Tanret reactions,
still irregular. Red cells 3,580,000. Quinine stopped
24 hours. Tanret reactions all negative. *Quinine, gr*
given intravenously but Tanret reactions still negative throu
the subsequent 24 hours. Quinine increased to gr. 60 dail
mouth (3 doses of gr. 20) for one day only. For the first
since admission signs of cinchonism appeared in the for
tinnitus, deafness and some giddiness. Tanret reac
were, for the first time, positive throughout 24 hours. Qui
reduced to gr. 45 daily by mouth for 4 days. Tanret rema
positive over this period and the signs of cinchonism
tinued. Marked subjective improvement. T. 98·4° F.
cells 4,800,000. Quinine reduced to gr. 30 daily by m
(3 doses of gr. 10) for 5 days. Signs of cinchonism disappe
and Tanret again became irregularly positive. Qu
reduced to gr. 20 daily by mouth (2 doses of gr. 10) for 3 d
All Tanret reactions negative on this dose.

Various doses of quinine were tried before the suppres
dose was ultimately fixed at gr. 40 of quinine by mout
doses of gr. 20). On this amount Hb rose to 88% and Ta
reactions were positive daily in about two-thirds of
specimens. Cinchonism was absent. The patient was
out of the tropics, since this appeared too large a suppres
dose to be continued, in spite of the fact that he felt fit for

first time since arrival in West Africa and wished to return to duty.

OBSERVATIONS DURING CONVALESCENCE

From the 12 histories quoted above it will be noted that 6 men (cases 7–12 inclusive) required, during convalescence, a dose of quinine by mouth greater than the prescribed daily suppressive dose of gr. 5 before even a single positive Tanret reaction could be demonstrated in their urines in the next 24 hours. Twelve others, with the same deficiency, were found among the 88 whose Tanret reactions during treatment of the acute attack with gr. 30 daily had been regularly positive. In all, therefore 18 soldiers out of 100 excreted no quinine in their urines for 24 hours after the suppressive dose they were ordered to take. The minimum doses required to produce even one positive Tanret reaction in these 18 men were: gr. 40 for 1 man; gr. 15 for 7 men; and gr. 10 for 10 men. Unfortunately, the number of attacks is not known for all these 18 men, but reference to the histories of cases 7–12 shows that these 6 soldiers had all suffered too numerous attacks for their safety—a total among them of 45 attacks in a period of 72 months—an average of over 7 attacks per man per year.

CONTROLS

As controls we studied 53 soldiers who were at the time of the test in good health, whose blood-films were free from malaria parasites and whose hæmoglobin readings were over 80% (Haldane scale). Of these men, 33 had suffered one attack (but not two) of malaria while the remaining 20 had had no malaria as far as could be discovered. No difference in the Tanret reactions was found between those who had and those who had not passed through an attack of malaria. None of the men had been less than 6 months in West Africa, and all had taken a suppressive dose of gr. 5 of quinine daily since arrival.

Procedure.—All urines were examined before the test and gave a negative Tanret reaction. The men then swallowed, under our personal observation, a dose of gr. 5 of quinine in solution. They reported at 15, 30 and 60 min. after the test-dose and then at hourly intervals in order to pass urine for examination. After a strong positive reaction appeared we stopped the hourly examinations, but did a final test in each man 24 hours after the dose of quinine.

All the 53 men showed strongly positive Tanret reactions within 5 hours of taking the quinine, but all the urines again became negative within 24 hours. There were great individual differences as regards the appearance and duration of positive reactions. None were positive at 15 min., 5 at 30 min., 15 at 60 min. and the remaining 33 between 2 and 5 hours. We did not follow the disappearance of the positives in all cases, but of 5 we did examine all were negative again within 10 hours.

DISCUSSION

Checking administration by Tanret tests.—One of the commonest misapprehensions regarding the Tanret test is that a positive reaction is obtained in the urine within 15 min. of taking a dose of quinine and that the reaction persists for the rest of the day. Thus Byam (1922) alleged that 70 out of 100 pensioners under treatment for malaria were not taking their quinine because he found a negative Tanret reaction in that number, which he says would have been impossible "had even a five-grain dose been taken and absorbed within the previous 24 hours." The French anti-malaria mission in Salonica (1918) acted upon a similar assumption. As Wenyon (1921) confirms, a French soldier could be asked to produce a specimen of urine *at any time* for a anret test. A single negative reaction was held to prove that the man had not taken his prophylactic tablet of quinine (gr. 6). Had we relied upon no more han a single examination at say 1 hour after the dose had been taken—a common procedure—we should have recorded only 37·7% (20 out of 53) as positive, whereas by continuing the examinations at hourly intervals up o 5 hours we found that all of 53 soldiers in normal health who had taken gr. 5 of quinine under supervision gave positive reactions.

Controlling therapy of acute attacks by Tanret tests.—n our 100 men, every patient who showed positive Tanret reactions in all urines during treatment rapidly ecovered from his fever. On the other hand, when Tanret reactions were completely absent during the treatment by mouth (cases 1–7) the patients were all acutely, even dangerously, ill. Administration of intravenous quinine to such men was always followed by a rapid improvement in health, accompanied by positive Tanret reactions in the urine. Thereafter ordinary doses of oral quinine were enough to control the fever and maintain the positive Tanret reactions. We believe that the Tanret reaction, used in this way, is a simple and reliable guide to discover men who require parenteral quinine. It will be noted that vomiting and gastro-intestinal disturbances—usually given as important indications for parenteral

control—a point we shall refer to later.

In 5 men (cases 8–12) the Tanret reactions, though not completely negative as in cases 1–7, were most irregular. Nevertheless, these soldiers were not given intravenous quinine to control their acute attacks, partly because they were not so dangerously ill and partly because we wished to compare their progress with cases whose Tanret reactions were positive in all urines. Recovery was distinctly slower both as regards duration of pyrexia and disappearance of symptoms, and in future we gave parenteral quinine to patients of this type.

It is of interest that in the acute illnesses where we gave a single dose of intravenous quinine, sufficient to control the infection, the subsequent Tanret reactions were positive on oral quinine in doses which had been previously insufficient to produce such a result. This finding fits observations and practice of earlier workers, which do not appear to have sufficiently influenced the courses of quinine generally advised today. Manson-Bahr (1931) recorded that "heroic" doses of quinine might be required to save life, but that when such doses had brought the disease under control smaller amounts sufficed to continue treatment. Stitt (1910) quotes Torti's experience in the Panama zone that large doses of gr. 45 of quinine daily should be given "at the commencement of treatment." Deeks (1925) advised up to gr. 60 of quinine a day for the first 2 or 3 days. It was only by this means that any progress was made in treating case 12.

These doses are not, of course, required everywhere. Nicol and Shute (1942) writing—as they emphasise—of people returning to England, have described the control of subtertian malaria with very small doses of

appeared to

in the doses

many parts

and who are difficult to treat successfully, and in consequence speculation about "quinine resistant" strains has arisen. We have not met "quinine resistance" and believe that treatment controlled by the Tanret test, as we have described, would do much to cut out this bogy.

Tanret test in fixing daily suppressive doses of quinine.—Where, as in hyperendemic areas, daily suppressive treatment is a necessity,

minimum effective dose.

influenced by factors of

malaria and duties. Indiv

absorption, metabolism and

to play a part, and it seems important that a high attack-rate was found in those of our convalescents (cases 7–12) whose daily do

insufficient to give positive

urines. Parsons (1922) thoug

accounted for some of the alleg

(now called "suppressive") quinine. He quotes a "Macedonain observer" as having stressed the need to determine the optimum dose of suppressive quinine for each locality and strain of parasite.

Quinine excretion and blackwater fever.—Of the 12 men described above, 3 have some association with blackwater fever. Cases 2 and 5 are known to have developed blackwater fever 6 and 7 months after our observations; case 10 had suffered from the disease 8 years before. Outside the 100 soldiers referred to, we have been able to examine 2 blackwater fever convalescents who both required gr. 15 daily to produce positive Tanret reactions. By the time these facts had raised in our minds the question of a possible association between some abnormality of quinine metabolism and blackwater fever, the opportunity had passed to make further observations.

The number of attacks of malaria, which the Tanret negative cases have passed through, obviously brings them to the point of "continuous infection" which is commonly regarded as a "pre-blackwater" stage. Ramsden, Lipkin and Whitley (1918) studied the quinine content of blood and urine in a patient during two attacks of blackwater fever and found in both attacks values for urinary quinine much below those of normal patients, even after renal function tests were normal.

Cause of negative reactions.—Possible causes of the negative reactions are:—

Evasion: We were fully aware of the way in which soldiers evade doses of quinine and took precautions—described in the text—to ensure that this was not the explanation in our patients.

Non-absorption: This is the commonly accepted explanation but we feel that, whatever part it may play, it is not the complete answer. Vomiting or other gastro-intestinal disturbances occurred in only one of the 12 patients described and in none of the convalescents. Patients with acute and chronic amœbic and bacillary dysentery, achlorhydria and peptic ulcer gave positive Tanret reactions on normal doses of quinine. Finally, in case 12, the most difficult in which to produce positive reactions, a negative Tanret followed even an intravenous injection of quinine.

Errors of quinine metabolism: Previous workers have referred to this question. Ramsden and Lipkin (1918) state that concentrations of quinine in the blood of chronic malarial subjects are always much lower than in healthy men taking the same dose of the drug. Wenyon (1921) referred to the difficulty of treating chronic malarial subjects who had been treating the disease by continual dosing with quinine, and suggested that the body might have acquired some capacity to get rid of or store up quinine so that it failed to reach the parasites at all. Fletcher (1923), investigating alleged failures of quinine, mentioned the possibility of excessive destruction of the drug in the tissues, perhaps more marked during acute attacks or as a result of prolonged subclinical infection. Ramsden, Lipkin and Whitley (1918) showed that extracts of liver in vitro could destroy quinine.

If excessive destruction of quinine by the tissues be accepted as all or part of the explanation of the poor excretion it may be that "heroic" doses in the early stages of treatment and parenteral quinine act in the same way by forcing the level of the drug in the blood to a point at which enough free quinine escapes destruction to kill the parasites and be excreted in the urine as in the ordinary case. Where quinine is not pushed to these levels the excretion apparently remains impaired, even in convalescence, and the efficacy of the normal suppressive doses may be so lessened as to favour frequent recurrences (cases 7–12).

We regret that we had not the facilities to do quantitative estimations of quinine in blood, urine and other excretions, in an effort to take these views beyond the realm of speculation.

It is of interest to note that Bryant (1942) in treating subtertian malaria in the Sudan with atebrin found that to control severe malaria it was necessary to administer atebrin in much larger doses than are usually recommended and that he formed the opinion that the lethal action of atebrin on the parasites was not marked until the renal threshold of the drug had been reached; when the urine became bright yellow, the temperature fell and the patient immediately improved.

SUMMARY

Tanret tests for quinine were done on all urines of 100 British soldiers admitted to hospital suffering from subtertian malaria in Southern Nigeria and on 53 men in normal health.

Reactions were examined during acute attacks treated by gr. 30 of quinine by mouth daily for 7 days, and during convalescence after the daily suppressive dose of gr. 5. Precautions were taken to ensure that the drug was swallowed.

Of the 100 patients, 88 who showed positive reactions in every urine during treatment of the acute attack made id recoveries.

After gr. 5, all the 53 normal men showed positive reactions, but these did not appear within 15 minutes and persist for 24 hours as they are commonly supposed to do. Only 20 men showed positive reactions within an hour, the others became positive between 1 and 5 hours.

By comparison with these standards some deficiency of quinine excretion was shown by 24 of the 100 men; 6 were deficient only in the acute attack, 12 only in convalescence and 6 in both acute attack and during convalescence.

In 7 men quinine was absent from all urines during the acute attack. They remained seriously ill until given intravenous quinine; then they showed positive Tanret reactions in all urines and recovered rapidly. Only one had negative reactions in convalescence.

A group of 5 men who showed positive reactions at irregular intervals during the acute attack recovered slowly and showed negative reactions during convalescence.

The 6 men whose excretion was deficient both in the acute attack and during convalescence had all suffered *repeated attacks at short intervals.*

The findings are discussed and their relation is considered to the condition of "continuous infection," which commonly precedes blackwater fever. The need for adjusting quinine courses in individual cases in relation to quinine metabolism is emphasised.

CONCLUSIONS

Despite precautions to ensure that quinine was being regularly taken, 24 out of 100 malaria patients showed negative Tanret reactions in all or many of their urines during treatment and convalescence.

Their responses to quinine treatment compared unfavourably with those whose Tanret reactions were regularly positive.

It is suggested that quinine administration and dosage in treatment and daily suppression (prophylaxis) should be controlled and adjusted for each individual by using the simple Tanret test in the way described.

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PLASTER TECHNIQUE IN FRACTURES OF THE TIBIA AND FIBULA

THE SWALLOW-TAILED ANTERIOR SLAB METHOD

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FRACTURES of both bones of the leg constitute one of the commonest injuries at the present time, both in civilian and service casualties. The object of this paper is to describe a method of applying plaster which has been found extremely useful in such cases. Its advantages are that it gives the surgeon complete control over the fracture at all stages without the use of special apparatus and with the minimum of skilled assistance. At the same time, it gives such freedom of access and manœuvre for the application of the plaster that the most accurate moulding can be obtained. These advantages have an added value at the present time, when surgeons may have to work single-handed under conditions which preclude the use of complicated apparatus. The method was originally devised for use in the operating theatre but it is now used in my clinic as the standard method for all "long leg" plasters.

Most fractures of the tibia and fibula with displacement can be so accurately reduced by manipulation that they remain stable to gentle impaction—that is, they do not become redisplaced when the fragments are gently pressed together This applies even to many so called "unstable" oblique varieties, for there are often ledges or notches on the fragments which can be engaged to produce a reasonably stable reduction Manipulation must be done early, however, before swelling makes palpation difficult, and it must be done under the full relaxation of anæsthesia Those oblique fractures which are genuinely unstable will require either traction or internal fixation (my own preference is for the latter) but in either case the subsequent application of a plaster cast will be rendered much easier by the method to be described A recently reduced fracture may easily be redisplaced during the application of plaster if there is any movement of the limb It is for such cases that the present method is most useful, for not only does the limb "stay put" from the moment of reduction to the completion of the plaster, but the fracture can be controlled with ease and absolute certainty throughout the whole procedure Finally, it is ideally suited to a patient on traction on a Thomas splint

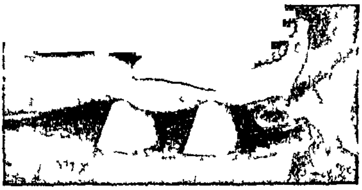

Fig 1—Leg supported on wedges, with ankle held at a right angle

The essential feature of this method is the use of an anterior slab, fashioned in such a way that once it sets it effectively fixes the whole leg "Cellona" is suitable for the purpose, because of its quick setting properties and the ease with which a dry "tailored" slab can be prepared The exact technique is as follows —

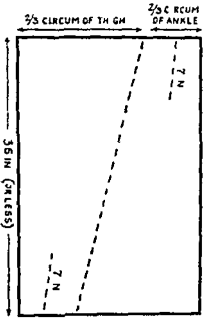

Fig 2—Pattern for swallow-tailed slab

Anæsthesia is induced either by low unilateral spinal or by continuous intravenous "Pentothal" The fracture is then accurately reduced the test of this being its stability to gentle impaction The leg is then placed on two wooden wedges 5 in high as shown in the illustration (fig 1) The upper one is placed just distal to the knee joint and the lower one at the level of the fracture A block or sandbag can then be placed under the heel arranged at such a height that the alignment of the fracture is correct when viewed from the side These wedges can be made easily by the hospital carpenter or handyman but if they are not available, a Thomas wedge or a hernia rest make convenient substitutes It will be found that with the leg supported in this position the knee joint assumes the optimum position for immobilisation—i e , 10°–15° of flexion The surgeon standing at the foot of the table, can then correct any valgus or varus angulation by simply shifting the heel either medially or laterally Rotation at the fracture can be easily controlled by holding the foot as shown in fig 2 with the ankle joint supported at a right angle If an assistant or nurse experienced in the use of plaster is available the surgeon may prefer to hold the foot himself, but it is so easy to maintain reduction once the limb has been properly positioned that it may safely be handed over to the assistant if the surgeon prefers to apply the plaster himself

The basis of the plaster is an anterior "swallow tailed" slab prepared as follows (fig 2) In length it reaches from the upper third of the thigh to the sole of the foot Its width at the upper end is equal to two thirds of the circumference of the thigh at that level, and it tapers to a width at th [illegible] cumference [illegible] narrow end [illegible] of 7 in in order to form two "tails" If cellona material is used, 6 layers thickness will give adequate strength, but will be thin enough to allow accurate moulding round bony prominences Material 36 in wide will usually be found to afford the right length of slab, and is economical if cut in the following manner

The width of the material is used to form the length of the slab The measurements at the thigh and ankle are taken and added together This measurement is then marked off and the material folded on itself to make a rectangular slab three layers thick The measurement at the thigh is marked off at one end of this slab and the measurement at the ankle at the other end An oblique cut is then made from one to the other, thus providing two tapering slabs each of the correct dimensions These are then superimposed to give a slab six layers thick without any waste of material Should 36 in be too long, the "off cut" can be rolled into a circular bandage

After soaking in tepid water and smoothing out all air bubbles, the slab is applied to the front of the thigh and leg, the two tails being moulded accurately over the malleoli and brought round the sole to overlap in the form of a letter U (fig 3) Wet muslin bandages are then applied from the malleoli to the top of [illegible] only two small gaps [illegible] In a few minutes the [illegible] grip the whole limb [illegible] under [illegible] ing the [illegible] atform [illegible] and fixed by a spiral bandage Finally, the wedge under the knee is removed and the leg held up while a posterior slab is applied from the calf to the upper end of the plaster and fixed by a couple of spiral bandages, thus completing the cast

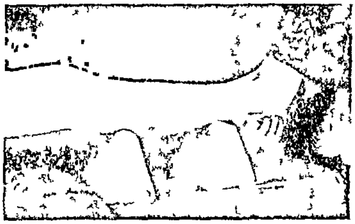

Fig 3—Slab applied

BLOOD-PICTURE AFTER MASSIVE TRANSFUSION

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THE following case throws doubt on two current theories—the first that large transfusions of group O blood into patients [illegible] blood group , the sec [illegible] tinins are neutralised [illegible] cells, the serum or the fixed tissue cells of the recipient and that nothing more is needed to explain the absence of all effects following transfusions with high titre serum

CASE HISTORY

A woman of 50, actively engaged as an industrial welfare worker felt faint after a light meal and immediately vomited a large amount of blood During the night she had two further severe hæmatemeses and fainted She was admitted to King Edward Memorial Hospital, and was immediately grouped found to be group B (3) and transfused with four pints of group O blood after cross matching of each bottle against her serum The following morning her hæmoglobin was found to be still only 60% (Haldane) During the next six days she had six further attacks of hæmatemesis and continuous melæna, and during this time, by continuous drip, she received 14½ pints of blood as well as considerable amounts of saline, given to keep the needles open between bottles of blood. In spite of this, on the seventh day of her illness, her hæmoglobin had fallen to 30%. During the next four days she received a further 8½ pints which brought her hæmoglobin up to 60%, when transfusion was stopped. She had received 23 pints in all, 22 of group O, and one—the ninth—of her own group B.

Since there were five other cases with severe hæmorrhages in the wards at the time, the house officers were so overworked that they had no option but to continue to transfuse with stored group O blood, believing that they ran the risk of killing the patient if they continued, but certain that she would die if they stopped.

There were two reactions: the first, a typical rigor, with the 8th pint; and a mild reaction with a sense of fullness in the chest and buzzing in the ears with the 23rd. There was never any jaundice, nor any urinary changes.

I was able to examine her blood a week after her last transfusion. Some of her corpuscles still reacted as group B. The serum in her contained no trace of agglutinins against known corpuscles of all four groups—that is to say, that one part serum to one part of a 2% saline suspension of corpuscles showed no agglutination microscopically after standing at 37° C., at room temperature or at 4° C. for 18 hours; for practical purposes she had become a universal recipient.

Clearly, had the agglutinins been merely neutralised by her serum or cells, the alpha agglutinins in the transfused blood and her own alpha agglutinins would still have been present. I anticipated that they would return gradually to whatever her normal would have been, and examined her blood again a week later and found that alpha agglutinins were present to a titre of over 1:1600. It was not possible to examine her blood again until her return from convalescence, six weeks later, when she had a normal blood-picture and her agglutinins had fallen to 1:64, which is probably her normal.

DISCUSSION

This case appears to dispose of the idea that it is possible to reverse the blood-group by using group O blood, and I find I am not alone in doubting this; Aubert and his colleagues (1942) expressed their scepticism and they receive support from Shamov (1940). A second point is that the disposal of the foreign agglutinins and the total suppression of her own was too efficient to be merely accidental. We must look at the only natural condition in which transfusion of agglutinins probably occurs—that is, between mother and child. I suggest that we have, in this case, a reversion to the intra-uterine conditions.

Evidence in support of this view can be deduced from a table in the paper of Lederer and his colleagues (1929) who analysed 500 pairs of mothers and children. Of the 126 children whose agglutinins would have been active against the mother's cells, all showed suppression of agglutinins, whereas 54% of those whose bloods were compatible with their mothers' developed agglutinins before birth; further, if agglutinins pass the placental barrier at all in man, and there is good evidence for this (Bourquin, 1921), then both incompatible and compatible agglutinins would pass to the child from the mother; and though it might be possible to explain the absence of the incompatible ones by a process of simple neutralisation by the appropriate agglutinins in fixed tissue cells or serum, yet a proportion of the children appear to dispose of all agglutinins irrespective of whether incompatible or compatible, and whether derived from their mothers or produced in their own bodies—a condition analogous to that seen in this case. Hirszfeld and Zhorowski (1925) suggest that this adjustment between mother and child is reciprocal, there being a tendency for the mothers producing agglutinins against their own infants to suppress them.

A less fantastic theory has been suggested to explain the present result; it is that among the donors used was a weak group A, misgrouped as an O, and that the changes seen were due to the immunity reaction following this. To meet this suggestion the history of the local donors was investigated. All but 2 had been used three or more times before and had been tested on at least four occasions. The remaining 2 were retested both as to agglutinins and agglutinogens. All have been retested since and their bloods used for other transfusions without a weak group A being detected. The donors not known directly to us were tested and bled by the Slough Depot and the blood retested by us. Apart from this, the change seen in this case is greatly in excess of that following any single injection of either incompatible blood or high-titre serum of a different group, since here the fall in agglutinins is to zero, whereas in the comparable cases of incompatible transfusion the whole cycle of reaction occupies a shorter time and the base line is not, apparently, reached.

This type of reaction had not yet been obtained with ordinary large transfusion of 4–6 pints given in a short time.

SUMMARY

A case is reported in which transfusions of 22 pints of group O blood and one pint of group B into a patient of group B, not only failed to reverse the blood-group but entirely suppressed all agglutinins in the recipient's blood for at least a week. This may be comparable with the suppression of agglutinins in the fœtus.

I wish to thank Dr. J. B. Harman for the clinical notes.

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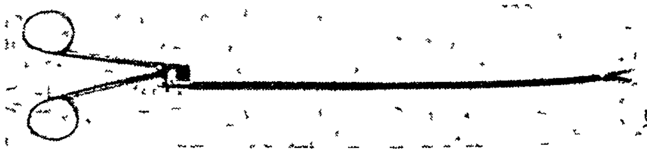
New Inventions

MALLEABLE FOREIGN BODY FORCEPS

THE advantages which might be expected from putting forceps jaws at the end of a malleable pewter probe led to the production of the following instrument. The first model was made in the field by putting a screw thread on one blade of an old pair of Spencer-Wells and screwing on a pewter anæsthetic tube. To the other end of this tube was attached jaws of a small pair of forceps, cut out from one prong of an electric-light plug, and activated by a wire passing down the lumen of the tube to a notch in the unattached shortened blade of the Spencer-Wells. This instrument has been useful in removing calculi from the calyces of kidneys or the ureter, especially when the organ cannot easily be delivered. It also proved valuable in palpating and removing metal or bony fragments from narrow and tortuous wounds along which straight forceps will not pass. This model has been improved and made presentable by Mr. Schranz of the Genito-Urinary Manufacturing Co.

The jaws consist of one fixed blade attached to the shaft and one movable blade. The blades are ½ in. long and $\frac{3}{16}$ in broad, rounded at the end, with fine smooth teeth, behind which the surface is recessed. The movable blade overhangs the fixed, thus producing the maximum gripping power, but with the minimum likelihood of damaging mucous membrane



The movable blade can be made to swing through 60° or more (½ in. gape), the range being adjustable. The shaft is a copper tube 10 in. long and $\frac{5}{32}$ in. in diameter (equivalent to a 14 French catheter). It bends readily, but when bent is more rigid than a pewter probe. The handles lie in the same axis as the shaft, in order to simulate closely the ordinary type of forceps, so that their manipulation and feel is as natural as possible.

The advantages of the forceps are these. The shaft can be bent into almost any shape that a pewter probe can be and the terminal forceps can still move through their range of movement and give a firm grip. Each calyx of a short pedicled kidney can be fully explored with the same instrument, with the least chance of damaging the mucosa. The jaws of the forceps work with precision and delicacy and yet give a firm retentive grip. Its blunt end and small diameter makes it a useful probe, and gives an excellent metallic or bony "feel" which makes it particularly valuable in exploring deep wounds. It can be readily passed along an examining finger and can often be employed to grip a foreign body at the bottom of a tortuous sinus when the ordinary forceps cannot be made to open sufficiently.

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Major RAMC.

Medical Societies

SOCIETY OF MEDICAL OFFICERS OF HEALTH

AT a meeting of the Fever Hospital Medical Service Group on July 16, with Dr. ANDREW TOPPING in the chair, a discussion on recent advances in the

Laboratory Control of Typhoid and Paratyphoid

was opened by Mr. A. FELIX, D SC, FRS, who outlined the theory and practice of the two recently introduced laboratory methods—typing of typhoid and paratyphoid B bacilli by means of Vi-bacteriophage, and Vi-agglutination tests as an aid to the detection of chronic typhoid and paratyphoid B carriers. Craigie and Yen (1938) found that strains of the typhoid bacillus can be divided into a number of types on the basis of their sensitiveness to specifically adapted anti-Vi bacteriophages. Typing by this method is as reliable as that obtained in streptococcal or pneumococcal infections by the old-established serological tests. This year, Felix and Callow have found that the bacteriophage technique can be applied also to strains of the paratyphoid B bacillus. Anti-Vi phages of *Bact. paratyphosum B* can be adapted to develop a high degree of specificity for particular strains, whereas anti-O phages are incapable of such adaptation. So far four different Vi-phage types of *Bact. paratyphosum B* have been identified, and more than 90% of the strains isolated from patients and carriers in Great Britain during the past three years were found to belong to those four Vi-phage types. The new typing method is an indispensable laboratory aid to the investigation of sporadic cases or outbreaks of typhoid and paratyphoid B fever. The detection of a chronic carrier is usually difficult, though the methods of isolating typhoid and paratyphoid bacilli have been greatly improved through the introduction of refined culture media. In all the recent outbreaks of paratyphoid B fever in this country the persons responsible for the spread of the infection were found to be temporary excretors. The true culprits—the chronic carriers—escaped detection. The Vi-agglutination test, which originally applied to typhoid alone, has now been extended to paratyphoid B fever. Dr. Felix demonstrated that this test can be used as an aid to the detection of [illegible] patients, who otherw[illegible] hospital because of the [illegible] of bacilli. A decreasing Vi-titre will indicate temporary excretion, whereas a steady or rising Vi-titre will arouse suspicion as to a possible chronic carrier state. Dr. Felix expressed his belief that the laboratory methods now available enable the public-health authorities to reorganise and intensify the fight against the chronic typhoid and paratyphoid carrier. Close coöperation between clinician, epidemiologist and laboratory worker now seems to promise to lead far towards the ultimate eradication of the enteric fevers.

Dr. W. H. BRADLEY (Ministry of Health) remarked [illegible] l recalled [illegible] ıce Louis [illegible] William Budd of Bristol recognised typhoid as an alimentary infection in the middle of the nineteenth century, and since then enteric fever has been split up into a number of groups—first by the identification of the typhoid bacillus by Eberth in 1880, and then by the recognition of the para-organisms and the other salmonellas at the turn of the century. Now by the application of the power of certain bacteriophages to lyse the organisms of typhoid and paratyphoid it is possible to make a further analysis into a considerable number of "phage types" and a new era in the epidemiology of the enteric infections is opening. Dr. Bradley illustrated the application of this new method to epidemiological field studies. He showed how at one time a number of cases of typhoid appeared in a cathedral town in the south-west. This group would have defied investigation had it not been found that they belonged to three different phage types; when studied on this basis they proved to originate in three separate sources of infection operating simultaneously. It was possible to trace these sources to separate foci outside the city. More recently, 14 cases of typhoid occurred in an extra-metropolitan borough using its own water-supply, which naturally came under suspicion because an alternative common aliment could not be identified. The appearance in a neighbouring borough of 2 more cases of typhoid of the same type in persons who had not consumed the suspected water helped [illegible] supply. It is usual f[illegible] to occur in a boroug[illegible] For example, although only about 50 cases of typhoid were notified in London in 1942 they occurred in 22 of the 28 boroughs. It is rarely possible to trace the source of infection or to relate cases arising in different boroughs. Since the beginning of 1943 an attempt has been made to apply phage typing to this problem. Up to June cases of typhoid have appeared in 10 boroughs. The great majority of these have been related to three foci of infection. Of the remainder, 2 cases were imported, another arose in a mental hospital and one only proved resistant to investigation. Dr. Bradley supported Dr. Felix's opinion that with careful and persistent epidemiological inquiry and specialised bacteriology it should now be possible to account for almost every case and in time to eradicate completely the enteric fevers, but certain changes in current practice are necessary. Hitherto the bacteriological objective of clinicians was to obtain sufficient negative cultures to clear the patient; now the indication is to perform immediate and repeated blood, stool and urine cultures until the organism is [illegible] into account the clinical development of the disease, [illegible] as accurately as [illegible] ıis date and also [illegible] ent to the medical [illegible] rce of the disease. [illegible] ıcal evidence that organisms of different types differ also in virulence, and to some extent typing may be of prognostic value. He also recommended the use of Vi determinations in the detection of carriers. As a preliminary screen for a carrier, in a food-handling establishment for instance, the Felix Vi-test simplifies investigation enormously. Taken in conjunction with the evidence obtained from circumstantial inquiry, this screen eliminates a large part of the need for wholesale stool and urine culture, and gives a prompt and more dependable answer.

Dr. ROBERT CRUICKSHANK (LCC) thought that the crux of the situation is the chronic typhoid carrier. Recovery of typhoid and paratyphoid organisms either in the acute stage of the disease or in convalescence demands the use of selective media. This is true over the whole range of bowel infections. Their use, for example, has demonstrated that convalescent carriers occur after salmonella infections, a thing never suspected in the past when MacConkey's medium was employed.

Dr. A. L. K. RANKIN (Twickenham) described the clinical features in the small extra-metropolitan borough outbreak mentioned by Dr. Bradley. In the adult cases the onset [illegible] had a gastro-intestinal [illegible] cases was their mildness. [illegible] the temperature showed marked morning remissions, which Dr. Rankin regards as a good prognostic sign. Leucopenia was present in all cases. The diazo test was consistently negative but no case was admitted before the 11th day of disease. One woman developed the uncommon complication of mastitis.

Colonel G. W. M. **Findlay** wondered if it would be possible to treat typhoid by phage given intravenously. In India dramatic results were claimed by the combined use of phage and typhoid antitoxin to deal with lysed products. In mouse experiments he has found it necessary to give phage very early to obtain a therapeutic effect.

Dr. **Bradley**, in reply to a question, said that gastro-intestinal symptoms at the time of ingestion of typhoid bacilli are common—they were encountered both in the Croydon water-borne and the Bournemouth milk-borne outbreaks. Intestinal symptoms, consisting of the passage of blood and mucus, are usual to begin with—vomiting comes later. The whole upset is usually over in 48 hours. He described an hotel outbreak where 36 guests had gastro-intestinal symptoms within 48 hours of arrival and 17 subsequently developed typhoid.

Dr. **Felix** suggested that the gastro-intestinal symptoms are not necessarily due to typhoid or paratyphoid organisms. They may indicate only that the vehicle is heavily contaminated with other organisms, including preformed toxins. He agreed with Colonel Findlay that in the phage treatment of experimentally infected mice the results are good in typhoid whereas no effect can be seen in aertrycke infections. This is probably because typhoid is not a usual infecting organism in mice whereas aertrycke is. He has used phage in large intravenous doses in the treatment of chronic typhoid carriers but the experiment was a complete failure. Yet the same phages had been tested in broth and up to 50% ox bile where they produced complete sterilisation. He thought that phage treatment might be tried on carriers of shorter duration where there is less heavy damage at the local focus of infection.

Reviews of Books

Pulmonary Tuberculosis

Hans Jacob Ustvedt, md Oslo, first assistant physician to the State Hospital, Oslo. (Bale. Pp. 252. 25*s.*)

This book is based on a series of lectures delivered by Dr. Ustvedt to medical students at the University of Oslo, and though it is primarily intended for the undergraduate reader it should inform a much wider circle, for it contains an account of the Norwegian, or more strictly the Scandinavian, view of the natural history of tuberculosis. It has been divided roughly into three parts: tuberculous infection; progressive pulmonary tuberculosis (phthisis), and treatment, with an additional chapter on miliary tuberculosis and prophylaxis. The section on infection (of which the Norwegian school of phthisiology has made a particular study) is as lucid an exposition as can be found anywhere. The original work of Heimbeck, Scheel, and Ustvedt himself is freely quoted in accounts of the clinical manifestations of the primary complex, the significance of tuberculin testing and of erythema nodosum, and the time-relation between infection and disease. The steps leading to the early recognition of established disease are well set out, but the demonstration of tubercle bacilli in the fæces is not given its fair share in the diagnosis. The many pitfalls in the diagnosis of tuberculous cavities and of radiological opacities in the region of the lung root are well discussed.

The author's bias in treatment is towards methods of collapse, which are placed before general or constitutional measures. In so far as this emphasises the need for early diagnosis there is something to be said for it, provided the impression is not created that the sanatorium routine is of secondary importance. No praise of this good book would be complete which did not include the fine translation by Dr. A. L. Jacobs.

Physiological Principles in Treatment

(8th ed.) Sir Walter Langdon-Brown, md camb., frcp; Reginald Hilton, md camb., frcp. (Baillière. Pp. 323. 12*s.* 6*d.*)

This book is pleasantly written, with sufficient personal and historical allusions to merge it into the general development of British medicine. The emphasis is on treatment, and though the physiologist might complain that scientifically it is not analytical enough, and is too freely interpretive, the practitioner is safeguarded from undertaking any treatment based on theoretical considerations alone: as the authors point out, principles and not details of physiology are the foundation for their work and they give these clearly. Sometimes they seem to be unaware of a recent development, sometimes they are able (as in the case of renin) to show it is not really new; but they always preserve a sense of proportion, and—as its 34 years' record suggests—the book probably achieves its progressive object better by being brief, direct, and in the best sense conservative, than by a wordy advocacy of passing scientific applications.

Out of Working Hours

Henry Yellowlees, dm, frcp, dpm. (Churchill. Pp. 152. 8*s.* 6*d.*)

Dr. Yellowlees is a gifted occasional lecturer who succeeds in his aim " to say something practical, helpful and perhaps thought provoking about some branch or application of medicine, and to say it interestingly," in this collection of lectures. It would, however, have been more satisfying to the reader—as apart from the listener to whom they were first addressed—if some passages had been made more temperate. He calls psychological medicine, for instance, " the greatest and the most important and the most difficult and the most personal branch of medicine ": perhaps it is, but surely this belongs to the " provocative generalities " which in the previous sentence he had deprecated. The medical and still more the general public can, however, learn from these vigorous addresses much about the broad aspects of mental hygiene, as well as something about the temperament and outlook on life of the distinguished psychiatrist who delivered them.

Institutional Care of Dependant Children in New Zealand

H. C. Matthew. (Oxford University Press. Pp. 141. 6*s.*)

This book, no. 18 of the publications of the New Zealand Council for Educational Research, describes a survey carried out since the war in institutions run by some of the religious bodies in that country. Mr. Matthew reviews the methods of other countries, lays down standards for institutions, and then describes what he found in those he visited, dealing with their buildings and administration, and the physical care and social life experienced by the children. The survey shows how far the problem of the dependent child is from being solved even in material things. We read of barrack-like conditions, of an interminable inheritance of second-hand clothes, of lack of contact with ordinary children and ordinary homes, and of the opportunity for handling money. The survey strengthened his conviction that institutional care should be avoided wherever possible. Like mental defect, dependency is a vast and persistent problem and we are only too willing to put it behind institution doors, comfortably out of sight, and forget about it, salving our consciences by buying a flag now and then. Mr. Matthew should go further and carry out a comparable study of foster homes, but the method should not be too objective. A woman brought up in a public assistance home who refused to let her own child go to a similar institution said the two chief disadvantages were the favouritism and the constant changes in staff and inmates which left the girl with a feeling that she had no fixed place in the world. These defects are not mentioned.

Messrs. Heinemann are in the process of publishing a series of collected researches from the inoculation department of St. Mary's Hospital. The first two volumes, being papers by Sir **Almroth Wright** on war wounds and clinical pathology, have already appeared; the third is the first series of his " Studies on Immunisation " (25*s.*) which appeared first in 1909 and is now reprinted handsomely, with every advantage of type and paper. The second series of these classic studies is now in the press.

THE LANCET

LONDON   SATURDAY, SEPTEMBER 11, 1943

ANTITOXIC IMMUNITY

This war has seen the launching of large scale campaigns for the defence of particular sections of our population against two enemies—diphtheria and tetanus—which are essentially toxin infections In such infections control must be principally by prophylaxis, since toxin, once formed, quickly enters and destroys the cells in vital tissues ; the clinical onset of infection is often insidious, so that therapeutic antitoxin may be given too late ,

be prepared from ,

which renders the toxin non-poisonous without affecting its antigenicity. It is obviously wiser therefore to protect the population at risk by active immunisation before they are intimately exposed, rather than give them a passive and temporary immunity by antitoxin after exposure or attempt cure after onset of the clinical infection It may sometimes be desirable to combine both passive and active immunisation—for example, among the susceptible contacts of a family where diphtheria has broken out, or on the battlefield to ensure an immediate and high degree of resistance to tetanus From the recent work of Cooke and Jones[1] it seems that, if this is done, the first injection of toxoid may with advantage be delayed for several weeks after the injection of antitoxin Inevitably the adoption of large scale active immunisation against diphtheria and tetanus has raised fresh problems, some of which can be solved only by practical experience Nevertheless, the experimentalist in the laboratory can give useful pointers

On another page Hartley and his colleagues at the National Institute for Medical Research provide some answer to two questions Do adverse conditions, like shock, acute infection, exposure to cold and restricted diet, interfere with the body's capacity to produce antibody in response to an antigenic stimulus , and Does the boosting dose given some time after the primary inoculations provide the individual with a better residual immunity than he would otherwise have ? The first question was prompted by the theoretical consideration that a shocked and wounded soldier, although actively immunised against tetanus, might fail to produce sufficient antibody to counteract any incipient infection with the tetanus bacillus The results suggest that under a potent antigenic stimulus there is a good prospect of adequate antibody production even in the rigorous conditions of the battlefield, though a "shock " infection like gas gangrene may interfere to some extent with the response What is still in doubt is whether the stimulus of natural toxin in a wound will provoke a sufficiently early and adequate antibody response to protect susceptible nervous tissue against infection Hartley's findings indicate that after an injection of toxoid a rise in the antitoxin level may be demonstrable as early as the 5th day, but Zuger and his co-workers[2] demonstrated that immunised guineapigs infected with tetanus spores fail to show any increase in antitoxin until the 8th to 10th day Indeed the response was often too late to prevent the onset of local or generalised tetanus A smaller proportion of animals given an injection of toxoid at the time of infection developed local tetanus It seems from these experiments that an actively immunised person with a low basal immunity may not escape clinical tetanus unless he is also given a protecting dose of antitoxin at the time of wounding, and this has in fact been an experience in the British Army[3] If, however, this basal immunity can be kept at a higher level the risk of clinical infection will be greatly reduced In a strictly controlled field test Evans has established the investment value of a third dose of antigen to immunised persons. The graph which he has prepared from the antitoxic titres of persons given a boosting dose of tetanus toxoid 10 months after completion of the primary immunisation shows that 1½ years later the antibody content of their blood is at an appreciably higher level than that of those not given the *injection de rappel* Since the boosting dose is now used in both the British and American Armies the chances of the wounded man contracting tetanus must be minimal Here are lessons to be learned and applied in the immunisation of children against diphtheria

Gas gangrene, another of the toxin infections, has not yet been brought to heel, and an incidence of 0 3% with a fatality of 50% among the wounded in the Middle East campaigns[4] suggests that active immunisation, if practicable, would be worth while among the armed forces W J Penfold was an ardent believer in its practicability, and it is fitting that his pioneer work should be carried on by the Lister Institute Robertson and Keppie report in this issue that using as antigens concentrated and partly purified toxoids prepared by the bacterial chemists, they have been able to protect guineapigs against many lethal doses of the three common gas gangrene anaerobes As might be expected, best results were obtained against *Cl œdematiens*, the most purely toxic in its action Animals given a primary immunity by two injections at 3-weeks interval were as resistant to infection with this organism as others given an additional boosting dose, and this immunity was maintained for some months Toxoid to *Cl welchii* also produced a good primary immunity which could be reinforced by secondary immunisation , but as in tetanus the secondary response occurred more quickly after an injection of toxoid (3rd to 5th day) than it did with a natural infection (more than 5 days) Resistance to infection with *Cl septicum* could not be easily induced by primary immunisation but the boosting dose gave a solid immunity This protection afforded by an antitoxic immunity against an organism of considerable invasive activity corroborates the experimental results in the prophylaxis of gas gangrene with septicum antitoxin[5] The Lister workers point out that for protection of animals against these gas-gangrene anaerobes a reasonable antibody-content is necessary, and no doubt, if active immunisation against gas gangrene becomes a reality, the boosting dose will be found as essential as it appears to be in the other toxin infections.

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[1] Cooke, J V and Jones F G *J Amer med Ass* 1943, 121, 1201

[2] Zuger B , Greenwald, C K and Gerber H *J Immunol* 1942, 44, 309

[3] Boyd, J S K and MacLennan, J D *Lancet*, 1942, ii, 745

[4] MacLennan J D *Ibid* 1943 ii, 63 94, 123

[5] Craddock, S and Parish, H J *Brit J exp Path* 1931, 12, 389

DOCTORS AND POLITICS

WHETHER they like it or not, doctors in the next few months will have to take an interest in politics. If they are to form an opinion on the coming white-paper which they will not later regret, they must study the evidence presented by the various official and unofficial bodies and so protect themselves from following blindly the enthusiastic exponents of this or that view. They are likely to be bombarded with memoranda, pamphlets and questionnaires and must be able to turn on each the cold scientific eye which they have learned to use on the advocates of a new drug or the inventors of a new syndrome.

Similarly they should be cautious in their approach to the public. The path of the propagandist is perilous, and the ease with which one may go rather too far along it is conveniently illustrated by a pamphlet lately issued by the Sheffield branch of the British Medical Association. In their anxiety to arouse public opinion the writers have probably misrepresented the Government's intentions, as the following extracts will show:

> Mr. Ernest Brown, the Minister of Health, has expressed a wish to place all medical services under *Local Government control,* which means in this City under the *control of the Town Hall.*
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> * * *
>
> For your treatment you would have to visit a *Clinic,* and you would *have* to go to the Clinic in your own district. *You would have* NO CHOICE.
>
> The doctors in this Clinic would *not* be chosen by *you,* who alone knows the type of doctor you can trust. They would *not* be chosen by their own profession, who could at least assess their professional ability. *They would be chosen by a* LAY *committee,* who might be tempted to make these appointments with political ends in view.
>
> You might like *none* of the doctors in your own Clinic, but even if you do, the doctor you prefer might be "off duty," in which case you would have to see *any doctor who might be present.* Thus you might see a different doctor every visit. In other words, YOU WOULD HAVE NO FREE CHOICE OF DOCTOR, *and the doctor would be unable to choose his own patient, however incompatible the two might be.*
>
> If *you* were dissatisfied with your treatment, you would be unable to change your doctor as at present. Perhaps you could report an inefficient doctor, but *illness is urgent,* and meanwhile you would have to put up with inefficient treatment while your complaint was investigated by the usual bureaucratic machinery of committees, etc. In the meantime the patient might become crippled for life, or even worse, and you would be unable to go elsewhere for treatment.

From this the reader might suppose—is intended to suppose—that the Government set no store by free choice of doctor. Yet in their public statements several Ministers have gone out of their way to commend this principle:

> "Some people," said Mr. BROWN on March 26, "are afraid of an organised national health service, because they think it will inevitably be a soulless bureaucratic machine, by which patients will be dragooned into health and doctors dragooned into mediocrity and servility. If I believed that a service conceived in these terms was anything but an unreal bogy, I should myself be the first to condemn it, and I should shrink from the task of preparing for it. But I do not believe that an organised service must inevitably involve loss of personal or professional freedom. Health is an intensely personal matter and any national health service must be an intensely personal service. The family doctor, chosen by the family as their doctor, as the doctor in whom they have confidence and whom they often hold in real affection—this ideal must be the foundation stone of our service, and I am sure that it can be."

In the Commons debate on the Beveridge report Sir JOHN ANDERSON spoke of maintaining to the greatest possible extent the principles of free choice of doctor and of the family-doctor relationship as the background of general medical practice.

A pessimist has said that it takes a tank to fight a tank, and a fascist to fight a fascist: an enemy can be beaten only with his own weapons. The Sheffield branch, to justify their statement, might argue likewise that politicians must be fought with politics. But even in political warfare a high level can be maintained; and so far, in speeches on reconstruction of the medical services, no Minister has done less than justice to the plans of professional bodies. As people who claim the status of scientific workers, and have enjoyed scientific training, have we not a duty to apply scientific standards, so far as we can, to our political relations? Ought we not, indeed, to become a shining example to our fellow citizens? The difficulties are obvious, but so is the need.

ANTICOAGULANTS IN SURGERY

THE production of purified heparin and the synthesis of 'Dicumarol' have made it possible to exercise some control over blood-clotting. These two substances differ in their mode and duration of action, but both render blood less coagulable. Heparin has an immediate though somewhat transient effect, chiefly by inhibiting thrombin formation; the action of dicumarol, whether it is given by mouth or intravenously, does not begin for 24–72 hours but lasts a long time, and it probably depends on the diminution of prothrombin. There is a wide individual variation in tolerance to both substances, so that the effect of a certain dose cannot be accurately foreseen, and dosage has to be controlled by estimations respectively of coagulation or prothrombin times.

So far the main application of heparin has been in the prevention of postoperative thrombophlebitis and embolic complications, and in vascular surgery, but its scope may be far wider; thus D'ALESSANDRO[1] mentions its use in mesenteric, coronary and cerebral thrombosis. Its mode of administration and cost are drawbacks to its extended use. Heparin must be given intravascularly, the methods available being continuous, intermittent and regional; the regional method—direct injection into an artery exposed at operation—is used only in vascular surgery. The other two methods depend on intravenous injection, the continuous method being more widely practised in the New World and the intermittent in the Old. Since heparin is rapidly eliminated from the blood the continuous method seems more rational, but DE TAKATS[2] has found that even when a close watch is kept on the rate of flow it does not prevent fluctuations in the coagulation time; the disadvantage of undue immobilisation of the patient can be overcome with an apparatus which enables him to carry the saline flask, &c. about with him. The intermittent

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1. D'Alessandro, A. J. *Surg. Gynec. Obstet.* 1942, 74 (int. abst p. 62).
2. De Takats, G. *Ibid,* 1943, 77, 31.

method involves injections every 4–6 hours, and it is important to use a fine needle to preserve the vein for subsequent injections and minimise the risk of hæmorrhage. With regard to dosage some confusion has arisen through the different units of measurement, and because the potency of heparin varies with the animal from which it is extracted. The National Institute for Medical Research has adopted the Toronto unit. The Connaught Laboratories of Toronto supply a solution containing 10,000 units (about 100 mg.) of heparin per 10 c.cm. rubber-stoppered vial. For continuous administration 1 c.cm. of this solution is added to 100 c.cm. of sterile physiological saline, and this is given by intravenous drip at a rate which will keep the clotting time at somewhere about two or three times the normal figure. As a rule 20–30 c.cm. of solution is needed daily. De Takats has met with such wide variation in response to heparin that he gives a test dose of 1 c.cm. of this solution as a preliminary to heparinisation and makes a rough estimation of coagulation time at 10, 20, 30 and 40 min. after the injection, using a method simple enough, he says, for the student nurse. In his series hyporeactors were common among postoperative patients, and about 1 in 10 cases showed a hyperreaction.

The large series reported by Murray[3] in Canada and by Bauer[4] and Hellsten[5] in Sweden leave little doubt that heparin will much reduce the incidence of clotting complications after operation. Expense prohibits its use as a routine, but the Swedish workers maintain that by the use of venography to confirm the diagnosis in the earliest stages it is safe to confine heparin treatment to established cases, and that these will not amount to more than 2% of the patients admitted to a general hospital. At Mariestad Hospital it is the practice to do a venography—introducing a contrast medium into the deep veins of the leg and thigh and studying the vein shadows radiographically—in all cases with clinical signs suggesting thrombosis, and in this way about a quarter of suspected cases are eliminated. Unfortunately the interpretation of these X rays is difficult, and the clinical diagnosis of early thrombophlebitis is not easy. There may be merely an inexplicable rise in temperature or pulse-rate with some malaise, or pain in the calf or front of the thigh, often described by the patient and nurse as cramp. The skin may be discoloured—red, blue or bluish-white—sometimes in a marble pattern. A little œdema may appear behind the internal malleolus, and if both limbs are exposed for 10 minutes the affected one may not cool down like the other. There may be a local doughy thickening of the muscles, best felt when they are relaxed, and typically a tenderness along the course of the affected veins. But these signs are too vague to be always reliable. *The experienced surgeon will* recognise the patient who is specially liable to thrombosis—the fat plethoric type, or the woman who needs a difficult hysterectomy or other pelvic operation. It is here that dicumarol may prove valuable, for it has the advantages of constant composition and of being effective when given by mouth; even a single dose will prolong the prothrombin and coagulation times for 2–3 weeks. It has not yet been much used in this country, but the results reported from the Mayo Clinic are encouraging. Allen[6] and his colleagues divided 497 patients into five groups—those who had had an episode of pulmonary embolism or infarction after operation and survived, those with postoperative thrombosis, those who had had postoperative thrombophlebitis or embolism complicating a previous operation, those who had undergone abdominal hysterectomy, and those who had undergone various operations and presented such conditions as obesity, anæmia, neoplastic disease or varicose veins, regarded as increasing their liability to thrombotic complications. Dicumarol was given to these patients in 100 mg. capsules. The entire amount for each day was given in a single dose in the afternoon, that for the first day being 300 mg., and on subsequent days about 200 mg. The prothrombin time was determined daily after the third day, and the dosage regulated accordingly. In 477 cases a satisfactory increase in prothrombin time to 35–60 seconds (normal 18–22 seconds) was obtained. Thrombosis or embolism developed in only 4 cases out of the entire series of 497 patients receiving dicumarol, a figure far below the probable incidence. Two patients in each of groups 1 and 2 were affected, but in three of these the complication only developed when the prothrombin time had been allowed to fall below the desired level.

It is not possible to assess the value of dicumarol on this series alone. As De Bakey[7] points out, the prophylactic value of any anticoagulant is difficult to establish in such an unpredictable condition as intravascular thrombosis. Moreover, although apparently free from objectionable effects in most of the cases quoted, hæmorrhages were recorded in 31 cases by the Mayo investigators.[6] In 24 cases the bleeding came from the operation site, while in others it came from the gastro-intestinal and urinary tracts. This bleeding tendency is unaffected by vitamin K, but *fortunately can be arrested by transfusion of fresh* blood, which restores the prothrombin; stored blood is less effective owing to loss of prothrombin. Contra-indications to dicumarol, according to Allen and his colleagues, are renal insufficiency, purpura of any type, blood dyscrasia with a tendency to bleed, existing prothrombin deficiency, and subacute bacterial endocarditis—in general, when there is any evidence of widespread infective embolic lesions anticoagulation therapy is unsuitable. When dealing with a manifestly infective postoperative thrombophlebitis, proximal venous ligation when feasible is a more certain method of avoiding embolism. It may be possible to combine the anticoagulants so as to employ them to their maximum advantage. Thus in vascular surgery, where prevention of early thrombosis is all-important, heparin must be relied on for the first 3 days, but dicumarol can be begun simultaneously so that this will take over the control of coagulation when its latent period of 2–3 days has elapsed. Similarly in the treatment of an existing thrombosis, whether venous or arterial, De Takats

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3. Murray, G. D. W. *Brit. J. Surg.* 1940, 27, 567.
4. Bauer, G. *Acta chir. scand.* 1942, 86, suppl. 74.
5. Hellsten, W. O. *Ibid*, suppl. 73.
6. Allen, E. V., Barker, N. W. and Waugh, J. M. *Proc. Mayo Clin.* 1943, 18, 102, 107.
7. De Bakey, M. *Surgery*, 1943, 13, 456.

gives heparin and dicumarol together in the first 3 days. He urges caution in the use of heparin, because hypersensitivity is not uncommon, and he is insistent that it is unsafe to give dicumarol without a daily determination of prothrombin level.

Annotations

TOWARDS BETTER SIGHT

The University of Oxford is asking for £250,000 to found a department of ophthalmic research, and presents an excellent case for the appeal. Ophthalmology, in a practical way, has brightened the lives of millions; but the mere fact that it has done so much for so many has perhaps blinded us to its capacity to do more. Those who tend to regard it as a stabilised and static specialty will be disabused by the notes on Eyesight and National Health[1] which describe the Oxford project.

The objects proposed for research are the prevention of blindness, the improved treatment of eye disease, and the promotion of a higher standard of visual function throughout the land. The blindness following syphilis is preventable, though not entirely prevented, and on p. 334 Mr. Jameson Evans reports that ophthalmia neonatorum has been allowed to cause only one case of blindness in the Birmingham area in the last seven years. For detached retina research has already provided an operation "which gives, at the least, an even chance of restored vision." Many serious causes of defective sight, however, still await elucidation. Cataract and glaucoma, which account for some 70% of blindness in later life, cry out for further investigation, especially on the biochemical side. And was it inevitable that nearly a sixth of all children medically inspected in elementary schools in 1937 should have "defective vision and squint"? If so, how do we explain that (in 1938) the figure was 20% in London, but only 13·2% in the country? How far are eye defects—in Britain as well as in the tropics—preventable by sound nutrition? Hereditary blindness, the protection of eyes and eyesight in industry, and vision in the dark are other subjects demanding more attention. Again, experience in the RAF has proved the practical value of orthoptics, by which the eyes are trained to work together. "A comprehensive statistical research into the incidence of faults in binocular vision among the general population and an analysis of the results of treating such defects are needed. For instance, can people so treated discontinue wearing glasses? Probably many could. A psychological factor is sometimes present in spectacle wearers; certainly many more people wear glasses than really require them." In the study of important disorders such as migraine the ophthalmologist must maintain contact with psychologist, biochemist and internist; and all members of the profession must remember that the eye alone provides a window through which living processes can be studied.

Considering these facts even briefly, it is little wonder that Oxford should expect a good response, not only from employers of labour and from insurance companies, but from "all good citizens." The university already has the services of an accomplished investigator in Miss Ida Mann, FRCS, who is Margaret Ogilvie reader in ophthalmology. The new plan includes the erection and equipment of laboratories, lecture rooms, a library and a museum in connexion with the Oxford Eye Hospital when it is rebuilt at the end of the war, and the provision of salaries and working costs for full-time and part-time research-workers, teachers, and technicians. Even on a comparatively short view, it is doubtful whether money could be spent to better purpose.

PSYCHOLOGY OF THE REJECTED TABLET

Over and over again we learn that medical discoveries are relatively useless unless they can be applied—unless the remedies or preventives can be brought to those who need them, and brought at the right time in the right form. Even when this is done, the complex activities of research-workers, manufacturing chemists, epidemiologists, quartermasters, pharmacists and clinicians may still be nullified because the patient—the proposed beneficiary—is not in the mood for medicine, or has somehow been set against it. A case in point is the difficulty of preventing disease in armies when the preventive is a regular dose of medicine. In his paper on p. 317, which is interesting and important for other reasons, Major Howie recalls that in the French Army in malarious countries any soldier could be required to furnish evidence that he had had his daily dose of quinine: "*pissez!*" said the sergeant; and if the Tanret test proved negative, the man was on a charge. This dramatic—and, as now appears, unjust—method has not been adopted for our troops, who today are given mepacrine ('Atebrin') instead of quinine; but something of the kind may be needed unless they can be persuaded to take their prophylactic more seriously.

The reasons for refusal are several. In the first place, the British soldier has long believed that any medicine administered to him when he is not sick can have one object only. In the last war, it was almost universally supposed that sergeants put Epsom salts in the tea, not with a view to promoting regular habits, but in order to reduce sexual potency. Such a belief would be laughable if it were no more than occasional. But prophylactic mepacrine seems to have revived it on a wide scale. (The belief is not confined to mepacrine, but also extends to prophylactic ascorbic acid.) Nor is this the only misapprehension about mepacrine: it is also said to be both dangerous and ineffective. The story of its toxicity appears to have arisen from a small outbreak of a non-malarial fever that happened to coincide in one unit with an initial course of the drug. This unlucky coincidence has enlarged itself, like an air-raid damage rumour, until the story now goes of an army prostrated by the tablets. The allegation of ineffectiveness is based, apparently, on the prejudices of the fabulous Colonel B; he is never tired of recounting how he has spent fifteen years in the tropics, and never a drop of these damned quinines has passed his lips; he's never had malaria, though he does admit a few sharp doses of fever. Faced with this barrage of myth and hypothesis, and the knowledge that malaria means for most people a couple of fairly pleasant weeks in hospital, what wonder that the soldier slips the tablet into a capacious cheek and later spits it into the wilderness of Tunisia.

This is clearly no simple problem for the doctor: it is a job for the educationist and the psychologist. The true facts about the values and dangers of mepacrine should be in the hand of every officer and man. In particular, the origins of the various rumours should be explained. And it should be made clear that malaria, even if not always dangerous to life, is not without its sequelæ, and that it is capable of delaying for long periods a campaign on whose ultimate outcome depends the speedy return of the troops home. Finally, if this is practicable, the dosage of mepacrine should be revised so that it is taken in a smaller quantity daily rather than four times a week. This would help to bring its administration into line with the thousand and one other bits of daily routine which are done with never a thought.

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[1] Issued by the Ophthalmological Research Endowment Committee. Secretary: Mrs. de Boisse, University Registry, Oxford.

RECTAL FEEDS

MOST *students, asked about the functions of the large* intestine and rectum, would enumerate a little list with a confidence suggesting that the subject is a closed book Yet within the last few years one or two of our classical ideas about these organs—that they excrete calcium and iron, for instance—have been proved wrong[1] There is still a good deal of uncertainty as to what these parts of the alimentary canal should be expected to do There was the bright idea that the rectum can absorb water selectively from sea water, and that life boats should be provided with Higginson syringes as well as oars and sails The suggestion was a survivor—and a most unphysiological one—of the last war, but it needed a lot of controversy and experimental work to scotch it This ultimately established that it could do a thirsty man no good to put sea water into his rectum, and fortunately a practicable still has since been evolved[2] The administration of "physiological" saline by rectum is of course a widespread practice, and 1–2 litres of water, with various salts, can be given daily in this way, but at one time it was customary to serve ambitious repasts in the rectum—eggs and wine were often incorporated into the so called nutrient enema This was given up largely because there was no conclusive evidence that the nutrients were absorbed, but the subject has been reopened by a study of the rectal absorption of glucose, salt and predigested protein Mackenzie,[3] working with children in Glasgow, concludes that both the glucose and the peptones are absorbed, the glucose very irregularly, and salt almost as well as when it is given by mouth, but not all his evidence is convincing, and children may well differ from adults in this function Alcohol, like other anæsthetics, is apparently well absorbed, but fats and undigested proteins are not, and may even be harmful because of the toxic substances formed by putrefactive bacteria Neither will the rectum *absorb enough amino acids to maintain nitrogen equilibrium*, and it seems better nowadays to give both them and glucose intravenously if the normal channels are unavailable, and to stop fiddling about with the rectum as an ersatz stomach Nature designed the alimentary canal for one way traffic and it is wise to conform to such regulations

PRETIBIAL FEVER

Daniels and Grennan,[4] of the US Army Medical Corps, describe an obscure febrile disease observed in 40 soldiers quartered near one another, between July 29 and Sept 11, 1942 The relatively sudden onset was characterised by malaise, mild general aching, lumbar pain, severe frontal headache and postorbital pain On the 1st or 2nd day mild respiratory manifestations (coryza, sore throat, cough) were complained of by 12 of the patients In about 10 there was nausea and vomiting Fever with recurrent chilliness or rigors persisted for *2–8* days, *averaging 5 4 days, with a maximum of* 99 8–105 6° F Lumbar puncture was performed in 3 cases with stiffness of the neck accompanying the headache, but the cerebrospinal fluid showed nothing abnormal and no obvious relief of the headache followed the puncture There was no decided enlargement of lymph glands but the spleen was early palpable in nearly all cases and remained enlarged for from 5 days to over a fortnight About the 4th day 24 of the cases developed an unusual symmetrical rash over their shins, consisting of raised, warm erythematous blotches with ill defined borders, sometimes slightly tender to touch and sometimes vaguely resembling erythema nodosum, none of them were purpuric In an additional 8 cases besides the pretibial rash, a few lesions were scattered elsewhere In 2 cases the rash became diffusely distributed over the entire body In one case there was only a single lesion on the hand No rash at all was found in 5 cases, otherwise typical In a few cases the rash appeared to be urticarial The cutaneous manifestations in most cases lasted only 2 days The leucocyte count ranged from 2800 to 14,000 per c mm, but leucopenia was present at some time during the acute illness in all except 5 cases, in 14 cases there was a slight terminal leucocytosis Differential counts showed little deviation from the normal Blood cultures (done in all cases) were sterile various agglutination tests were negative and malarial parasites and the spirillum of relapsing fever were not found All the patients rapidly recovered without complications A search for possible insect vectors led to no result Inoculation experiments have so far failed and the cause of the disease remains obscure An outbreak possibly of the same disease in about 35 cases in August 1940 was described by Bowdoin[5] A sporadic case, if observed in London during an influenza period, would most likely be labelled "influenza with a rash" or "atypical erythema nodosum," and these American observations may help to lessen the number of such headings

BIOCHEMISTRY OF EFFORT SYNDROME

MANY efforts have been made to discover the somatic disorder in effort syndrome Although neurotic inadequacy in the majority of these patients is well recognised, many doctors find it hard to account for the history of lifelong incapacity for effort otherwise than by supposing that there is some bodily inferiority which may be qualified as constitutional, physiological or psychosomatic

One such explanation appeals to the phenomena of hyperventilation Soley and Shock[6] concluded that "the respiratory alkalosis resulting from hyperventilation produces the symptoms of effort syndrome Guttmann and Jones[7] could not confirm this view, but Quinn[8] adheres to it and suggests that, along with psychiatric treatment, rebreathing or holding the breath should be employed when the patient has symptoms of hyperventilation, he even advocates the administration of ammonium chloride to keep the blood pH at such a level that alkalosis will not result even though the patient over breathes Quinn, however, produces no fresh evidence, and the thesis he supports cannot be taken as proved, or even plausible Master,[9] who has lately *examined 30 naval patients with effort syndrome*, which had mostly developed while the men were in training, found that they had small hearts on X ray examination, and yielded an electrocardiogram showing a small QRS–1 and tall QRS–2 and 3 with occasionally a tendency to a right axis deviation In other patients with effort syndrome he found changes in the electrocardiogram after exercise which he interpreted as indicating inadequate blood supply to the heart muscle On rather slender evidence Master concludes that men of asthenic physique who have had symptoms of neurocirculatory asthenia before enlistment possess a constitutionally small heart which does not eject enough blood per minute to nourish the heart, skeletal muscles and organs of the body adequately in response to effort

There is a striking contrast between the conclusions of such writers and those arrived at by Jones and Scarisbrick, reported elsewhere in this issue When the latter required patients who had a history of almost lifelong effort intolerance, without conspicuous emotional dis turbance, to carry out exercise, the fatigue which developed could not be attributed to respiratory alkalosis, though there might in some be a fall in the bicarbonate level following the production of lactic acid. The level of lactic acid reached in these experiments lent no support to the view that patients with effort syndrome behave otherwise in physiological respects than other people. There is much evidence that average young men will desist from muscular effort because of exhaustion when the level of lactic acid in the blood has risen to approximately 100 mg. per 100 c.cm., though older men desist earlier, and trained athletes only when the lactate has reached a higher level. Although in one or two instances Jones and Scarisbrick have observed a high lactate rise and a considerable fall in pH after relatively slight effort, none of the patients in the series they have recently examined exhibited this; yet they commonly desisted from effort while their lactate level was still low. It seems therefore that a psychological rather than a physiological anomaly has been demonstrated; the patient's bodily response to exercise does not differ in any discoverable respect from that of other subjects of his own age, but he gives up work much earlier than they would. It is unfortunate that the estimation of lactate in the blood, which affords so useful an indication of whether the man is at the point of maximal effort, is so technically difficult and delicate a procedure that it cannot be utilised more widely as an indirect measure of deficient endurance.

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[1] Nicolaysen R *Skand Arch Physiol* 1935 72 1.6 Welch O S Wakefield L G and Adams, M *Arch intern Med* 1937 58 1035

[2] See *Lancet* Mar 22 1943 p 667

[3] Mackenzie J W A *Arch Dis Childh* 1943 18, [illegible]

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[6] Soley M H and Shock N W *Amer J med Sci* 1938 196, 40

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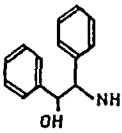
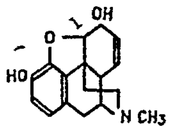
MORPHINE SUBSTITUTES

For many years now attempts have been made to synthesise substances with the properties of morphine, that most valuable drug without whose help, as Sydenham remarked, few would be sufficiently hard-hearted to practise medicine. In particular, the aim has been to make substances which will be free of the most serious objection to morphine—addiction—and much valuable work has been carried out on this subject under the auspices of the American National Committee on Drug Addiction. One of the difficulties in such work is that no really satisfactory experimental test exists for evaluating the effects of substances on the types of severe pain met with in disease. Ultimately the clinical test must be relied on for determining this, the most important action, though there are other actions of morphine with which new compounds can be compared experimentally. More evidence for and against pethidine has accumulated since it was summarised in these columns on May 8, and Batterman and Himmelsbach[1] have compared its status with that of morphine. This drug, first synthesised by Eisleb and Schaumann[2] in 1939, has three main types of action—*analgesia, spasmolysis,* probably dependent on its similarity in chemical structure to atropine, and *sedation.* It is more effective in the relief of visceral pain (e.g., from the peritoneum, pleura, smooth muscle) than of pain arising from skeletal and neurological structures. In *postoperative patients* it is, according to Batterman and Mulholland[3] more suitable than morphine, since it does not produce constipation. When used repeatedly in the control of chronic pain tolerance develops rapidly, as is the case, of course, with morphine. Pethidine can produce addiction even to the extent of physical dependence, so that on discontinuation of the drug an abstinence syndrome consisting of characteristic signs and symptoms develops, but it seems that addiction is unlikely to occur if therapeutic requirements are not exceeded. Batterman and Himmelsbach suggest that not more than 150 mg. every 3 hours should be given if habituation and undue cerebral irritability are to be avoided. A higher dosage may have no greater therapeutic effect and may have serious consequences. In pain due to spasm of smooth muscle pethidine may give dramatic relief. This applies not only to the intestine but also to other smooth muscle. Thus, Climenko and Berg[4] have demonstrated an antispasmodic action on the intact ureter, which probably explains the value of the drug in renal and ureteral colic. It has, on the other hand, the advantage of not inhibiting the contraction of the pregnant human uterus, even in large doses.

American investigators have approached the problem of morphine substitutes by the production of morphine derivatives or of synthetic phenanthrene or carbazole analogues, but Dodds and his co-workers[5] have set out to produce simpler compounds of the diphenylethylamine series, having in chemical constitution the same kind of relation to morphine as the synthetic œstrogens of the stilbene series have to œstradiol. Preliminary clinical tests suggest that progress has been made. The most active compound, of which the formula is shown here with that of morphine, relieved pain when given by mouth in doses of 50–400 mg. every 4 hours.

β-hydroxy-αβ-diphenylethylamine





Morphine

NEUTRON TREATMENT OF CANCER

The "medical cyclotron" at the Crocker Radiation Laboratory of the University of California is being applied to the treatment of cancer. Stone and Larkin[6] mention that the first cyclotron used for treatment produced a beam of deuterons with 8 million electron volts (Mev.) of energy; the one they used is a bigger edition completed in December, 1939, the energy being stepped up to 16 Mev. The deuterons thus energised are in turn used to produce neutrons and with the beam in question the maximum energy of the fast neutrons is 21 Mev. Between December, 1939, and September, 1941, 128 patients were treated; 8 of them did not complete the course. Most of the 120 patients were selected for this treatment after a considered opinion that they could not be cured by surgery or X rays. The malignant lesions were: tongue 18, prostate 18, skin and lip 13, breast 11, larynx and pyriform sinus 9, floor of mouth and alveolar ridge 13, stomach and intestine 9, buccal mucosa 5, brain 4, nasopharynx 3, parotid 3, œsophagus 2, miscellaneous 12. The general lines of technique were those employed in deep X-ray therapy when an immovable X-ray tube with a horizontal beam is used. The reactions to treatment were classified as mild, moderately severe, severe and improved. Nausea and general malaise were classed as moderately severe; they became so severe that the patients required supportive medication. Irradiation of the upper abdomen caused severe systemic reactions and diarrhœa in almost all cases. Of the 120 patients treated, 61 had died by October, 1941. Of this group, 31 had gross tumours at the time of death; 29 of the 41 patients who had cancer of the mouth or throat had persistent ulceration at the time of death. Stone and Larkin take a sober and detached view of the whole investigation. They say "While the statistics presented appear discouraging, the effect of neutrons on tumours has been such as to encourage further study in selected cases. It was demonstrated, both clinically and pathologically, that some cancers disappeared as a result of neutron therapy." It should be borne in mind that the patients were mostly beyond relief by other measures.

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Special Articles

EFFECT OF EXERCISE ON SOLDIERS WITH EFFORT INTOLERANCE

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MB EDIN, MRCPE, DPM

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(From Mill Hill Emergency Hospital, London)

POOR effort response and ready fatigue are among the most important symptoms shown by effort-syndrome patients and for this reason effort syndrome is of particular importance in war-time. During the last war many attempts were made to find a physiological explanation for the poor effort response but without any great success (Haldane et al. 1919, Meakins and Davies 1920, Meakins and Gunson 1917, Cotton et al. 1917,

'Iore recently Soley and
he idea that respiratory
lation is responsible for
it from this the question
relatively little attention

in the period between the two wars. By the beginning of this war the emphasis had shifted to the psychological side (Jones and Lewis 1941). The interwar period however had brought a great increase in our knowledge of the physiology of exercise, and it was considered of interest to investigate again the physiological response of ES patients to exercise.

The type of physiological response to exercise most fully understood is the response to short periods of heavy work in which the muscular demands far exceed the body capacity of supply and there develops an oxygen debt, partly shown by increased tissue- and blood-lactate, and a rising acidity shown by a falling blood pH. These represent for us a picture of physiological distress and partly account for the feeling of fatigue associated with such efforts. We have attempted to exercise ES patients and control subjects to the point of exhaustion in a short time and to compare the response of the two groups as shown by the blood lactic-acid and pH changes. It was found that ES patients would not attempt very heavy work, so it was necessary to use comparatively light work (6750 ft. lb. per min.); in order to exhaust the controls work for them was increased in severity after 10 minutes.

The present study also afforded us an opportunity to

for the production of symptoms, including the fatigue felt in this condition.

MATERIAL AND TECHNIQUE

A group of 10 patients was chosen all of whom were free from organic disease and had ages ranging from 25 to 32. They all gave a history of effort intolerance from earliest recollection and it was felt that constitutional physical inferiority was more important in these men and had more to do with their excessive response to exertion than had emotional factors We have already suggested a classification for ES patients which is particularly designed to evaluate the physical and emotional factors found in this material (Jones and Scarisbrick 1942).

A group of 16 controls was taken from the available hospital staff and included 7 doctors, none of whom took any regular exercise, 4 members of the physical training staff, and 5 others of whom 2 did a certain amount of track running.

Blood samples were taken from the subject at rest, immediately after the cessation of exercise, to give the pH and lactate picture at the exhaustion point, and a third sample generally about 5 minutes later, to give the maximum lactate figure and also to determine the behaviour of carbon dioxide during recovery The first and third samples were arterial blood taken from the femoral artery of each leg. The second sample was arterialised venous blood from the median basilic vein of the arm which had been heated to 45° C. in an arm-bath, this was done in preference to arterial puncture because

been extensively studied elsewhere and the results would not affect the conclusions to be drawn about ES. The blood, having been withdrawn in an all glass syringe lubricated by the minimum amount of paraffin, was transferred under oil

cooled in ice water immediately.
oxygen capacity by the method
Slyke 1932), oxygen content and

carbon dioxide content (Peters and Van Slyke), pH; and lactic acid content (Barker and Summerson 1941)

The ergometer consisted of a bicycle-chain wheel and pedals connected by the frame to the ground wheel which has a friction band with weights and a spring balance. The whole is supported by two uprights off the end of the bed so that the subject can pedal as he lies on the bed; though unorthodox the position was comfortable, and was used in order to facilitate the collection of blood when the subject reached his exhaustion point. The rate of pedalling, 42 revolutions per min, was set by a metronome which the subject could both see and hear. A trial run was always given the day before until the subject was familiar with the machine The end point was taken when the subject, in spite of all encouragement, was no longer able to continue pedalling to the rate of the metronome.

It was found to be impossible to exhaust some of the control subjects within a reasonable time at the intensity of work used for the effort syndromes. In order to obtain an exhaustion end point, the intensity of work (6750 ft lb per min.) was raised at the end of 10 minutes by increments of 1700 ft lb. per min. every minute until a level of 10,000 ft lb per min was reached.

EXERCISE RESPONSE

All the patients performed less work than the least active of the control subjects The times recorded for the patients range from 3 min. 10 sec. to 7 min 15 sec., with a mean value of 5 min. 26 sec. Every control subject so far tested, both within and without this series, has been able to exceed this time

This poor performance on the part of the patients may have its origin in a definite physiological inefficiency, or in an abnormal psychological attitude towards the work, resulting in a reluctance to persevere. The conditions of the experiment were chosen so that physiological difficulty would show in most cases as a rising body acidity and a large rise in blood lactic acid. Gross physiological inefficiency would then be shown as the development of these signs of physiological distress as a result of the performance of a relatively small amount of work.

We have observed such inefficiency both in control subjects under certain conditions and in a few effort-syndrome patients.

One of our control subjects was normally able to work for 11½ min. as a result of which his blood pH had moved from 7 40 to 7 22 and the lactic acid content of the blood had increased from 12 0 to 80 0 mg. per 100 c cm. When he was tested in a post infective state, immediately after influenza, he was able to work for only 1½ min. but showed changes of lactic acid and pH similar to those shown when he was in good health (pH 7 42–7 26, lactic acid 10 7–81 7 mg per 100 c cm)

Exaggerated response to exercise, of this type, is occasionally found in effort syndrome, the following case is an example.

A
Scar
mon

of neurosis but he had a persistent tachycardia for which no cause could be found. He did not consider himself ill and had excellent morale. When tested on the ergometer he worked to complete exhaustion and shortly afterwards lost consciousness He worked for only 4½ min. His blood lactic-acid rose from 11 to 110 mg per 100 c cm. and the pH fell from 7 4 to 7·1.

In both these cases the body was responding very inefficiently to the work, as shown by the high lactate rise and large pH shift for the small amount of work done. The patients in the series reported here, however, did not show this exaggerated and inefficient onse
As a result of the exercise the lactic acid
mean resting value of 11 7 mg to a mean
5 min. after the conclusion of exercise (ra

mg. per 100 c.cm., the latter figure being outstanding and raising the mean considerably). The corresponding changes in the control subjects were: resting 11·4 mg. rising to 80·9 mg. (range 40·7 to 118 mg.). The breakdown in the ES patients is clearly not due to overwhelming physiological distress.

Any study of maximal fatigue is made difficult by the fact that the point at which a person gives up is an arbitrary one depending on various factors including mood, incentive, persistence, &c. According to Knehr and his colleagues (1942) the average young man will stop work on a treadmill when the level of lactic acid in the blood has risen to approximately 100 mg. per 100 c.cm.; and for some time it has been felt that the level of blood lactate obtained after exercise gave an indication of the general persistence of the subject. It has been found however that this figure is influenced by age, which lowers it (Robinson 1938) and by training, which raises it (Knehr et al. 1942). Figures as high as 200 mg. have been obtained with trained athletes. The control subjects used here, with the exception of the PT staff and the 2 runners were in general untrained and rather older than the patients and with 3 exceptions attained a level of lactic acid in the blood of 70 mg. or over. The lactic-acid level in the patients at the conclusion of the exercise was much less than this (mean 47·9 mg.) with one exception (case 9). The most obvious conclusion to be drawn then is that the poor effort response in ES patients is due to lack of persistence.

Oxygen metabolism.—It has been suggested (Haldane et al. 1919, Hick et al. 1937) that deficient saturation of the arterial blood with oxygen occurs in ES patients as a result of the rapid shallow breathing which has been described in these cases, and these authors attribute the fatigue and certain other symptoms of ES to this anoxia. The 10 cases presented here did not show particularly rapid respiration at rest and showed no sign of deficient arterial oxygen saturation at rest. The oxygen saturation of the arterial blood in these 10 cases when at rest varied from 97% to 92% (mean 95·6%). The discrepancy between the two findings is in all probability due to the choice of cases. We have had the opportunity of studying several hundred cases of effort syndrome and of these only a very small percentage show the rapid shallow respiration described by Haldane and his colleagues (1919); such extreme cases may suffer from deficient oxygenation. Certainly, as is shown by the cases presented here, poor effort response and ready fatigue exists in effort syndrome cases without any trace of arterial oxygen unsaturation.

Further we have obtained figures for the oxygen saturation of blood at the conclusion of exercise ranging from 90 to 95% (case 6 is an exception; here the oxygen saturation was only 72%); when it is remembered that these figures were obtained from arterialised venous blood, and that in normal subjects there is a tendency for arterial saturation to fall during strenuous exercise, it seems fairly certain that deficient oxygen saturation cannot be held responsible for the fatigue in ES.

HYPERVENTILATION

Respiratory alkalosis occasioned by hyperventilation has been much discussed since Soley and Shock (1938) suggested that this was responsible for some of the symptoms of ES. Earlier work done here gave no support to their contentions (Guttman and Jones 1940). Reports on the subject have recently been reviewed by Wood (1941). Our present concern has been to see whether hyperventilation with development of alkalosis occurred as a result of exercise in the type of patient we have described. The results show clearly that though there may be a fall of carbon dioxide pressure after exercise this is not abnormal in amount (generally 3 or 4 mm. Hg, the most extreme being a fall from 40 to 31 mm. Hg) and is correlated with fall of bicarbonate following the production of lactic acid. In no case did the blood pH become more alkaline than the resting value.

It might be argued that we have looked for the development of alkalosis too soon. We were guided by the fact that in all the patients chosen, excessive respiration had almost died away 5 min. after the conclusion of exercise, and whenever we have taken another blood sample after a further 5 min. this has simply shown a slow return of the pH to the resting value.

We have not tried to show that hyperventilation alkalosis does not occur in ES patients as a result of exercise, for in some few patients it undoubtedly does, but that in this particular group of patients, respiratory alkalosis did not contribute to fatigue and that hyperventilation alkalosis must be regarded as accessory to the symptoms of ES.

DISCUSSION

The 10 patients chosen for this study show very poor response to exercise as judged by the amount of work done. At the same time, however, there is no major biochemical abnormality in their response. The pH and lactate were in keeping with the amount of work done, though we have occasionally seen a case where the rise of lactate and pH shift is excessive for a small output of work. The latter type of response might be expected in a patient with for example a congenital heart lesion, but in the case we have recorded there was no evidence of any organic disease. Such a case furnishes the best possible evidence of effort intolerance in that the poor work performance is accompanied by maximal changes in the level of blood lactate and change of pH. This is not true of the group of patients studied whose poor work performance was accompanied by a proportionately small rise of lactate and change of pH. They all claimed to have worked to exhaustion point and objectively they appeared distressed though not so seriously as the control group. These men had had effort intolerance since childhood and had not played strenuous games. They therefore were not in the habit of driving themselves to exhaustion point as does th average man who plays football. On the contrary th avoided violent exercise and in 3 cases this was det mined by fear of possible physical damage resulting fr over-exertion. We feel that this type of work expe ment does give an index of the man's persistence in setting of physical distress. In those cases where really high level of lactate is obtained the test may a be said to give an indication of the man's physical p ficiency. For instance, a man whose blood lactate r to 90 mg. per 100 c.cm. but who only worked fo min. is obviously less fit than a man whose blood lact reached the same figure after working for 10 min. feel that some measure of persistence would be invalua for studying the "unwilling soldier" but realise that test outlined is technically too difficult for routine u We are investigating the possibility of a significa correlation between the results of this test and vario psychological tests of persistence.

In the patients studied deficient arterial oxyg saturation was not found at rest or as a result of exerci Further there was no tendency to the development o respiratory alkalosis after exercise though this does u doubtedly occur in some cases; such an abnormali however is incidental to the fundamental problem of p effort response in ES.

SUMMARY

The effort response in 10 patients giving a lifelo history of effort intolerance and in 16 normal controls h been studied, using a bicycle ergometer.

The amount of work done before reaching compl exhaustion was considerably lower in the patients th in the controls.

The rise of lactate and fall of pH was considerab greater in the control group than in the patients.

In the patients no evidence of deficient arterial oxyg saturation was found either at rest or as the result exercise.

In the patients there was no tendency to develop respiratory alkalosis after exercise.

The value of this test as a measure of persistence spite of physical distress is discussed.

We wish to thank Dr. W. S. Maclay, medical su tendent of this hospital, for permission to publish cases. We also have pleasure in thanking Nurses J. Asc J. Eedle, B. Marler, E. Nicholls, and P. Tait for t cal assistance, and Dr. R. Freudenberg for the loan of potentiometer.

One of us (R. S.) is indebted to the Medical Resear Council for a personal grant during the period of th investigation.

(*References at foot of opposite page*)

In England Now

A Running Commentary by Peripatetic Correspondents

ONE of my colleagues often grouses, but his popularity is undimmed for his grumbles are never personal to himself, and he expounds them entertainingly He labels his complaints "divine discontent" which he says is the fit and proper attitude towards things which are wrong and could be put right. His latest theme is that far too many people are appointed to important and specialised jobs because they are good at something totally different I must admit that having heard him expatiate on the point, his case has substance He first reminded me of two professors in our old medical school. One was appointed to a science chair as a young man on account of brilliant research work, and although this was well sustained, he was unquestionably the worst teacher either of us ever heard The other was appointed to a clinical chair because of his excellent lecturing style, and his clinical acumen turned out to be, shall we say, unimpressive. One finds many other examples of this principle of appointment, though admittedly they are not always unsatisfactory. A year or two ago, academic circles in America were set arguing fiercely by the election of one of the country's most brilliant chemists as president of a great university. That in this case the appointment was successful, and that the fingers which laid down the test-tube triumphantly took up the ad- [illegible] t ability of the [illegible] the success of [illegible] it is remarkable that a laboratory man could be so successful in so different a field.

'Long before this war it was commonplace that, when a research man reached a certain degree of eminence whether in academic or industrial circles, more and more purely administrative work was forced on him. The exigencies of crisis and emergency made this ever more inescapable, for, scarce though research men are, they are commoner than highly skilled administrators. The first lesson from these observations seems to be that research ought to be more widely appreciated as a job in its own right, and not one to be carried out by someone who is distracted by managerial work in a firm or teaching routine classes. The other lesson is that there should be more appreciation of administration as such, and the sceptre of organising authority should not be thrust into the hands of a man because he is an honours graduate in classics or conchology or was a prefect at St Winifred's and is a prominent member of the Drones Club.

* * *

[illegible] is more shackled than his lay [illegible] "Among the deformities at [illegible] ball I noted . . .," or "Dining [illegible] night I heard young Lord Mud telling one of his long myxœdematous stories, and recalled that his mother, the old Dowager, kept a splendid goitre . . ." Still we do our best. Last week I happened to be in our county mental hospital when they were doing their first leucotomy The patient before the anæsthetic talked continuously. she was being poisoned in 24 different ways by a ginger nurse—give me a cigarette—who scratched her and bit her in 24 different places—give me a cigarette—in 24 different dresses, a long list of names, give me a cigarette; over and over again like a spoilt record. It was easy to see one of the reasons why she had been selected. The surgeon removed a ¾ in. disc from each parietal, divided the dura and went in with his leucotome I don't know whether he was a bit of a water-diviner, but he tapped the ventricle from each side.

The prefrontal area is supposed to be connected with prevision, and merely watching the operation has stimulated mine I have been seeing a long shelf full of *Medical Annuals*, stretching into the dusk of futurity. I keep taking them down and slitting the uncut pages with a leucotome. Ah, 1953—"Any good results that followed the old operation of leucotomy are now known to have been due to neuro-protein shock." H'm, skip a decade. Here's '63, only one reference 'Blitzkrieg postulates the generally accepted fact that leucotomy of *any* part of the brain gives equally good results in mental patients" H'mm, don't suppose it's mentioned in '73, which I can just reach and read although it's in [illegible] am, So [illegible] many patients, but it did definitely kill the 'centre' idea, which prevailed from Aristotle to the phrenologists and surgeons of the '40s That the brain had definite 'centres,' each with its definite function, was the inevitable conclusion of shopkeepers and professional men in an ill educated mechanistic age They were not imaginative enough to grasp the universality of every part of the brain, its limitless capacity by reason of its limitless associations, so obviously they could not understand that when centres are formed as they are in many mental diseases, when nervous tracks are made and frequented as in paranoia, schizophrenia and the fixed cast-iron personalities, that in itself is a sign of degeneration, in other words impulses are conveyed along fixed paths because free communication between every cell and every cell is in some way hindered. If one falls back on the trite telephone metaphor, then a good telephone system with its exchanges, subexchanges, lines, numbers and subscribers is like a diseased brain, but in a healthy one every subscriber is in telepathic communication with every other subscriber at will Moreover, an extension of cortical tissue in an animal's brain does not mean any new centres, but that each cortical cell has so many more new associates It is obvious . [illegible]

* * *

Caramulo is a tiny village in the hills between Coimbra and Oporto In 1918 there was nothing there but the village. Now there is an enormous TB sanatorium with accommodation for 800 patients. The whole place has grown up through the enterprise and management of Dr. Lacerda, who is still in charge. We arrived unexpectedly in the evening thinking we should find a hotel in the village, but as there wasn't one the director [illegible] guese [illegible] and a [illegible] both the sucking pig and his charming daughters' fluent English. I had an excellent room in the sanatorium and next morning [illegible] he hills for a couple of hou[illegible] delightful. We spent most [illegible] sanatorium and its surrou[illegible] large and [illegible] ness or fittings. One is set apart for patients from the army, another for patients from the railway services and the navy. Staff and patients lunch together, and they seemed to have no difficulty in fitting us in. We saw the table ware being sterilised after each meal, and were taken over the milk sterilising plant, the laundry and the sewage farm, the effluent from which does wonders for Dr. Lacerda's orange groves further down the hillside. The whole show is a good example of what conscientious and efficient private enterprise can achieve, and there is a great need for such a place in Portugal where the incidence of tubercle is high.

* * *

'Without disloyalty to my old school or my old college, I must admit that the bulk of my useful education has been

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DR. JONES AND DR. SCARISBRICK. REFERENCES

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culled from the backs of cigarette cards and the wonderful Penguin and Puffin series."

This statement was back-broadcast from the year AD 2000 by a Cabinet minister with an unusually high coefficient of honesty, and its reception by me was induced by reading *Butterflies in Britain* (Richard Chopping, Puffin Picture Books, pp. 31, 9*d*.). This folder—it is not much more—deals with about half the British butterflies and has over fifty vividly coloured plates. I can imagine no easier introduction to this fascinating subject, though I regret a sentence on page 10 which might bring the wrath of cabbage owners on the innocent head of the greenveined white, a demure and delightful creature. People often laugh at the " bug-hunter" with his net and his smells of cyanide and camphor, and I think quite rightly, for he kills the thing he should love and his mind often never gets past the amor habendi in the cabinet drawer. But he who studies and respects them in the life—after all most of them were on these islands long before we were—like all who marvel at natural mysteries finds himself in a land of great peace. The modern youth's craving for mechanism is driven by a variant of the power motive and is a sorry tranquilliser, but he who studies nature enters into an old heritage and has the universe for his schoolroom. For a good naturalist not only delights in the mysteries of atomic structure and stellar spectra but will get as much content from watching a cloud of flies, the sexual eccentricities of the short-palped crane-fly, as from spotting the ductless glands that dictated a Prime Minister's speech or the motive structure of an Archbishop's sermon.

* * *

Office work in London is a sad error of pseudo-civilisation; like Mark Twain's brigand I cannot realise that I have only to open the window to get out.

Public Health

REGIONAL TREATMENT OF OPHTHALMIA NEONATORUM

P. JAMESON EVANS, M D CAMB, F R C S, DOMS
ASSISTANT SURGEON TO BIRMINGHAM AND MIDLAND EYE HOSPITAL

IN the past two years the increase in venereal disease has reached such proportions that a policy of publicity has been forced upon the Government, and this has been supplemented by regulation 33 B. At the recent meeting of the Blind Association of Great Britain concern was voiced at the rising number of blind babies afflicted with venereal disease, and in particular of those blinded through the complications of ophthalmia neonatorum. It is remarkable, therefore, that no such increase has occurred in the Birmingham area, and it may be of value to record the methods used in this city, to support the suggestion that an increase of blindness from ophthalmia neonatorum is preventable, even under war conditions.

The story of ophthalmia neonatorum in the past forty years is a striking record of preventive achievement. In 1901 Bishop-Harman noted that cases of blindness caused by ophthalmia neonatorum in the London County Council children formed 36% of the total, and this high proportion was probably present in the rest of the country too. The reduction in the number of children blinded by this cause is an example of excellent cooperation between the voluntary medical services and the public health authorities, and has been attained by a combination of administrative and therapeutic measures. The present incidence of blindness from ophthalmia neonatorum in the Birmingham area is extremely small: in the last seven years there has been only one case, in a population of 1¼ million.

DEVELOPMENT OF PREVENTIVE MEASURES

The first step towards improvement was taken in 1925, when the incidence of ophthalmia neonatorum was still very high, and the resulting blindness was not uncommon. Before that time the notification and treatment of cases was left largely to the discretion and ability of individual doctors and midwives, but in 1926 such a serious position had arisen that a meeting was called between the public health authorities and the committee of the Birmingham and Midland Eye Hospital, and it was arranged to concentrate the notification and treatment of all such cases, as far as possible, at the Birmingham and Midland Eye Hospital. Henceforth all midwives under the jurisdiction of the city public health department were obliged, and many nearby but beyond its authority were encouraged, to send all cases of purulent ocular discharge in infants to the hospital. Since then two notable results have been achieved—the city of Birmingham has by far the highest rate of ophthalmia neonatorum notification in the country, and it has the lowest rate of infantile blindness from this cause. These two facts are cause and effect.

The public health department gave financial assistance towards the maintenance of a ward at the hospital reserved for ophthalmia neonatorum, with provision for both babies and their mothers, and a nursing staff with specialised experience and skill. The treatment at that time was mainly after Credé's method, and demanded frequent saline irrigations. These involved a considerable degree of manipulation of the eye, with eversion of the lids, and could only be successfully undertaken without damage to the eye by those possessing a light and experienced touch. Even so, the results were not uniformly good, so that the number of eyes severely damaged in 1936–38 was ten, and in 1940–42 was four. Treatment with sulphapyridine has been standard since 1939.

Further extension of the nursing facilities for treatment was again provided in 1930, by joint arrangement between the public health department and the Birmingham and Midland Eye Hospital, when a system of home visiting by qualified ophthalmic-trained nurses was instituted; this has continued throughout the war years, and shows no diminution in value or demand. By this means control is obtained of the home environment, treatment is ensured at regular and frequent intervals, and the doubtful efficiency of the mother is eliminated. Between 2200 and 2500 home visits are paid annually by a special nursing staff (see table), and unsatisfactory cases are immediately referred back to the ophthalmic surgeon. Under the present war conditions in an industrial area, where many women are at work in factories and unable to give enough time to their children, the value of home visiting is greatly enhanced, and this is a potent factor in the maintenance of a low incidence of blindness in the city.

Year	Total notifications in B'ham	Treatments given	Home visits	Gon.-pos.	Complications
1938	1085	3138	2436	17	3
1939	995	4082	2395	11	1
1940	1039	3930	2388	7	1
1941	961	4209	2337	8	1
1942	1226	5914	2227	15	2

Home visits began in May, 1930.

SYSTEM NOW IN FORCE IN BIRMINGHAM

Any midwife in the city area having under her care an infant with a discharging eye, in which discharge has begun within three weeks of birth, is now required to send it to the Birmingham and Midland Eye Hospital. The age of the infant need not necessarily be within the three weeks defined by the public health regulations and older infants are also freely referred for advice and treatment both by midwives and by medical officers of child-welfare centres.

At the hospital the infant is examined by a doctor and a smear and culture are taken for pathological examination in all cases showing any discharge whatever, irrespective of the severity of the ocular condition. [illegible] this means many severe cases are seen, diagnosed and treated in their earliest stage, and often the [illegible] is checked before serious damage can occur. Immediate pathological confirmation is of great value also in the recognition of cases likely to become severe, and [illegible] governing the advisability of admission. All positive gonococcal cases are admitted and also a number of cases showing streptococcal or other virulent cultures— of notified cases, only 1% in the past five years has been of gonococcal origin.

	1936	1937	1938	1940	1941	1942
Admitted	96	62	80	27	15	17
Gon positive	8	7	17	7	8	15
Impaired eyes (gon)	2	1	2	0	0	0
Impaired eyes (non gon)	1	1	3	1	1	2

Before 1938 the routine treatment was a modified form of Credé's method, but silver nitrate was used as a rule in weaker strength than 1%, and emphasis was laid on the regular washing of pus from the conjunctiva and cornea by warm saline In severe cases irrigation was sometimes necessary two hourly day and night, imposing a severe strain both on infant and nurses, and demanding the utmost care in manipulation Fortunately, this exacting treatment is now seldom necessary, and certainly not for
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except in a few cases of obscure but not gonococcal origin, associated with marasmus With this drug, most gonococcal cases are free of discharge within four or five days, and no cases of recurrence have been encountered This treatment has reduced corneal ulceration both by the early removal of infected pus from the conjunctiva and cornea, and also by the elimination of frequent manipulations of the lids, which even in the most skilled hands were a constant danger to the œdematous corneal
admission,

, and if the
le is then
substituted , the latter drug agrees with most infants better than sulphapyridine Under this treatment almost all cases show rapid and complete recovery, but some cases growing staphylococci of the flavus group are still resistant to treatment

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It can be said, therefore, that in the Birmingham area ophthalmia neonatorum is under control, and that no increase in infantile blindness from this cause has been noted since the war Such a satisfactory state has resulted from the efficient preventive treatment adopted both for mother and child, the antenatal supervision of mothers, the concentration of treatment in a single centre where specially skilled nursing is available, and the early notification and treatment of all cases within the defined terms of the disease

My thanks are due to Dr E W Assinder, pathologist to the Birmingham and Midland Eye Hospital for help in preparing this paper

FROM THE ANNUAL REPORTS

The reports of MOHs for 1942 are in general uninteresting, for circumstances did not permit the exploration of matters which were not of immediate bearing upon the health of communities and the year did not present many features of outstanding importance But there are exceptions

Dr D M CONNAN (Bermondsey) reports a prosecution for the sale of curry powder containing 44 parts per million of lead The summons against the retailer was dismissed on the defence of warranty and that against the manufacturer on the defence that in present circumstances the presence of extraneous matter was an un

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due to (a) lowered resistance from anxiety, fatigue and

the same in 1942 as they were in 1941 and we should expect the results of continued adverse conditions to be progressive, unless there were some opposing favourable factors to neutralise those which are adverse The rise in tuberculosis in the last war proved to be temporary and when it was over in 1919 the decrease in the disease was resumed despite social conditions which were by no means favourable Possibly the chief element in causing increased mortality in the two wars is lowered resistance due to anxiety in those with present lesions which will either advance or recede according to environmental stresses If this is so mortality would tend to fall after a rise in any circumstances

The second comment is on the temporary suspension of slaughterhouses It is earnestly hoped, therefore, that after the war there will be no return to the old insanitary medieval conditions ' We have all had this hope since Ward Richardson's day—and have been disappointed for half a century , and now the war offers opportunity to convert the hope into a demand Amid the stress of so much to be done when the war is over let us not overlook this matter of slaughterhouses

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was probably rarer in 1942 than in any year since it was made notifiable and new cases of encephalitis lethargica could be numbered on the fingers For many years deaths from this disease have outnumbered notifications and now these too are declining, as the damaged relics of the epidemic which peaked in 1923 pass out of existence Cases of encephalitis occurring in the course of the common virus diseases (measles chickenpox, &c) were as rare as ever, the anxieties of the war have not, it seems made the nervous system more vulnerable to infection In Manchester with a population of over three quarters of a million, 20 deaths from CSF, 1 from polio, and 15 from acute infectious encephalitis were registered in 1942 There were 120 notifications of CSF, but Dr METCALFE BROWN gives no information on notifications of the two other diseases In no 1942 report as yet received is there special mention of polio or sleepy sickness

Infectious Disease in England and Wales

WEEK ENDED AUG 28

Notifications —The following cases of infectious disease were notified during the week smallpox, 0 , scarlet fever 1890 , whooping cough, 1915 , diphtheria, 614 , paratyphoid 7 , typhoid, 16 , measles (excluding rubella), 986 , pneumonia (primary or influenzal), 337 , puerperal pyrexia, 126 , cerebrospinal fever, 48 , poliomyelitis, 14 , polio encephalitis, 2 , encephalitis lethargica, 0 , dysentery, 129 , ophthalmia neonatorum, 130 No case of cholera, plague or typhus fever was notified during the week

The number of civilian and service sick in the Infectious Hospitals of the London County Council on Aug 25 was 1497 During the previous week the following cases were admitted scarlet fever 179 diphtheria 38 measles 43 whooping cough, 41

Deaths —In 126 great towns there were no deaths from measles or scarlet fever, 1 (0) deaths from an enteric fever 6 (0) from whooping cough, 10 (0) from diphtheria, 64 (2) from diarrhœa and enteritis under two years, and 7 (1) from influenza The figures in parentheses are those for London itself

Wallasey reported the fatal case of an enteric fever Manchester had 7 deaths from diarrhœa, Liverpool and Birmingham each 6

The number of stillbirths notified during the week was 184 (corresponding to a rate of 30 per thousand total births), including 12 in London

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PROTECTING THE X RAY WORKER —Last November the Minister of Health arranged for the National Physical Laboratory to assess the amount of radiation received by X ray workers in the course of their employment The test is made by means of a dental film which the worker carries in his breast pocket for a day It is developed and the tint compared with a colour series corresponding to known doses of
The Minister is anxious that this test should be made
three months and he is disturbed to learn that only
hospitals have so far made a second application for

Letters to the Editor

SWABBING OF CONTACTS IN DIPHTHERIA

SIR,—The memorandum on diphtheria published in your issue of July 3 embodied the experience of medical superintendents of London and provincial fever hospitals, bacteriologists and public-health administrators. Its chief aim was the promotion of a more rational approach to the problems of investigation, disposal and treatment of diphtheria and doubtful diphtheria. It discussed also a possible method of overcoming the present rigid system of notification which makes the published incidence figures entirely fallacious—an important matter in its relation to immunisation. In the space available no attempt was made to offer detailed advice on the control of diphtheria outbreaks but there was a definite plea for discrimination in swabbing contacts of a diphtheria case. Questions on this have been raised in letters from eight pathologists (*Lancet*, July 17) and Dr. A. W. Downie (Aug. 7) who also dispute the statement that "the child with a healthy throat and nose is not likely to harbour the KLB for more than a brief period, and, in the absence of catarrhal conditions, is not likely to disseminate diphtheria." Large-scale investigation of diphtheria has shown that individuals with healthy mucous menbranes eliminate the organism rapidly. The importance of an unhealthy mucous membrane in maintaining the carrier state is emphasised, for example, time and time again in successive MAB and LCC annual reports from 1926 onwards : the introduction of tellurite medium did not alter the fundamental truth of this observation. It is a commonplace experience in fever hospitals that healthy contact carriers revealed by swabbing have become free from infection by the time they are admitted to hospital. But even healthy carriers can be reinfected, particularly if they are treated in open diphtheria wards, as has often been demonstrated by a change in the type of organism. This factor must be taken into account in assessing the duration of any carrier state.

In the bacteriological investigation of a diphtheria outbreak a definite pattern is revealed, its intricacy depending on many factors. If circumstances are favourable to the organism, it may create many clinical cases but even more carriers. The carrier pattern is not static : early contacts, who may occasionally transmit infection in the interval, will often rid themselves of infection before any investigation could be undertaken, and other carriers will have taken their place for a short or long period. Routine swabbing may demonstrate a phase of this changing pattern, but it is wrong to assume that carriers revealed are necessarily playing any part in the outbreak other than as transient victims. The carrier with an abnormal nasopharyngeal mucosa is a much more potent source of infection, because he is likely to be persistent and to produce a heavily contaminated droplet spray. In outbreaks of diphtheria definitely traceable to a carrier the originator has in fact often been suspected first on clinical grounds—usually because of an unhealthy condition in the nose. Dr. Turton (*Lancet*, Aug. 21) upholds routine swabbing, but admits that a number (unspecified) of the 19 carriers found among 2176 children examined were only cleared after tonsillectomy. We would suggest that the work involved in swabbing this number of children was out of all proportion to the results achieved, and that had he acted on the lines laid down in the memorandum he would have found the probable causes much more easily.

Dr. Downie cites a small diphtheria outbreak in which 5 carriers were revealed by routine swabbing of contacts. He implies that their subsequent removal to hospital was responsible for bringing the outbreak to an end, but this is surely doubtful since 8 clinical cases had already occurred in the community of 24 persons, of whom 5 were shown to be immune. Every public-health administrator has experienced similar outbreaks which terminated on recognition and isolation of clinical cases without any swabbing of contacts. It is, however, *indiscriminate* swabbing and the facile assumption that the person found to harbour KLB is responsible for a clincial case that we deprecate. If circumstances point to a source of infection in the environment of a case, and particularly in closed communities where opportunities for transferring infection are relatively numerous, routine swabbing may be abundantly justified, but we are strongly of opinion that this procedure cannot be properly evaluated without simultaneous Schick-testing. Carriers revealed in this way need be segregated only until it is determined by further swabbing whether the condition is persistent and requires local treatment. Much more important than this in controlling an outbreak of diphtheria in these circumstances is to immunise the susceptible contacts.

ANDREW TOPPING,
President.

Fever Group, Society of
Medical Officers of Health.

NORMAN D. BEGG,
Hon. Secretary.

BLAST IN WATER

SIR,—The contribution by Goligher, King and Simmons, in your issue of July 31, has supplied a very useful and helpful guide to many of us who are seeing cases injured by under-water blast. This is a condition in which I have been interested for two or three years, and the following case is of significance in that it illustrates one of the difficulties in the diagnosis of the degree of intra-abdominal injury sustained.

A minesweeper was torpedoed at 04.00 hours and the order to abandon ship was given immediately afterwards. A rating clad in shorts and shirt, and wearing a life jacket, was swimming away from the sinking ship and when about twenty yards from the wreck one of the depth charges exploded. He said he felt as if he had stopped a football in the stomach, and he was winded for probably about half a minute after which he had a feeling of numbness in the abdomen but no pain. He swam about in the water strongly and moving his legs normally for four and a half hours until 08.30 when he was picked up by another minesweeper. He was rubbed down and given a cup of tea, which he enjoyed, but this he vomited ten minutes later. He had swallowed a good deal of fuel oil, and he continued vomiting for about one hour, but apart from the straining of the vomiting he had no abdominal pain. He was landed at 10.00 hours and walked to an ambulance, in which, about half an hour later and just before arrival at the hospital, he was seized with a sudden acute central abdominal pain which persisted until relieved by morphine. He was quite definite that morphine relieved the pain. Laparotomy was performed, and five perforations of the ileum were sutured. Recovery took place after a somewhat stormy convalescence with a pelvic abscess.

Now this rating was apparently fairly well and fit, with no marked symptoms, for six and a half hours after the injury. He could swim strongly, which he did for four and a half hours, and he could walk when ashore, without discomfort. Unfortunately there is no record as to the presence or absence of subserosal hæmorrhages. Were these perforations primary events, with a sudden onset of symptoms six and a half hours later, or were they secondary to interstitial hæmorrhages? The symptoms point strongly to the fact that perforations occurred in the ambulance, in which case they were secondary to hæmorrhages. If so, why did five perforations suddenly occur ?

This case would seem to indicate the importance of careful observation of all who have been exposed to under-water blast, and extreme caution in passing over a man who is at the time showing no symptoms significant of severe intra-abdominal damage. It challenges the belief of Palma and Uldall quoted in your annotation (p. 133), that the intensity of the abdominal pain is a fair measure of the gravity of the injury.

At a Naval Hospital.

P. G. C. MARTIN.

PURPURA OF THE SKIN

SIR,—In your issue of Aug. 28 Dr. Burnett has invited me, in effect, to write an article different in scope and purpose from the one you printed for me on Aug. 7. He thinks that the presence or absence of thrombocytopenia is a basic factor in all cases of purpura, but Macfarlane's review (*Quart. J. Med.* 1941, 10 N.S., 1) discourages this idea. Actually thrombocytopenia has nothing to do with purpura simplex—and *indeed* with most benign purpuras, which formed the bulk of my cases. Dr. Burnett suggests that my series should have been analysed into cases associated with platelet defect or with normal platelets, giving their respective bleeding, clotting and clot retractility times. But as these findings are known to be normal in many categories I enumerated, such a classification seemed unhelpful. (Haden and Schneider 1941, cited in my article, give just this type of information.) Thus I found no thrombocytopenia and no alteration in bleeding, clotting, and retractility times in even the severest cases of purpura simplex, Schonlein-Henoch, and cardiovascular purpura; whereas the findings in thrombocytopenic purpura, blood diseases, and hæmorrhagic diathesis simply confirmed standard work. I have no experience myself of "qualitative platelet defect" although I have read the papers of Glanzmann, Jürgens, &c.—and also the criticism of their work by Witts (*Guy's Hosp. Repts* 1932, 82, 465) and Macfarlane. So I had to seek clinical association—still, I hope, a useful quest.

Dr. Burnett is right to stress that because purpura occurs (say) at the puerperium it is not necessarily due to the puerperium; drugs, scurvy, and so forth must be considered. That is exactly what I did. Menstruation, pregnancy, and the puerperium were associated with skin-purpura in a dozen cases where they are classified under other headings. In my series I found purpura of the skin more commonly associated with certain general factors such as sex the rheumatic state, infection, and heredity than with blood abnormalities. When times are more spacious I should like to publish details of some of my categories.

St. Andrew's Hospital, E 3   ELI DAVIS.

PLANNING WITHOUT A PLAN

SIR,—The article by Dr Robb-Smith in your issue of Aug 28 is a great service to the planning of our health services. With almost all of it I disagree but with none of it do I quarrel, any more than the writer quarrelled with me in his criticism of what I have previously written. We are both striving for the same aim, so well put in the quotation he gave from Mumford, "to bring the geographical and [illegible] with human purpose" An [illegible] forward were intended, as I [illegible] to stimulate such studies a [illegible] Disagreeing as I do with his conclusions, I recognise that his is the [illegible] ect. What a contrast with t [illegible] of the British Medical Associa [illegible] (*Brit med J.* Aug. 7) is clearly seen, in the light of this article, as "plans without planning"

I cannot in your letter page answer all the points to which I would like to refer Let me say briefly that I disagree with the conception of a health unit of 250,000 and the whole paraphernalia of key hospitals cottage hospitals and the like [illegible] ith's pessimism—I will not [illegible] the number of doctors is not [illegible] a few large centres but their widest possible diffusion throughout the country, the 100 000 population health unit with its large general hospital, in an elastic structure, meets the needs of the people better than any other suggested

Secondly, I am glad that Dr Robb-Smith sets a standard of hospital staffing so much higher than I put forward I have so often been called utopian and accused of impracticable schemes that it is a change to be accused of parsimony My figures were an attempt to compromise between the most idealistic and the possible, a consideration for which we "planners" have more use than our opponents give us credit I have discussed these figures with surgeons and physicians all over the country and almost all have agreed with them. I cannot elaborate the matter now, but I would make one slight correction which does affect the argument, my "seniors" were not to be taken as the equivalent of "registrars."

I do not, however, agree that a 47% increase in medical personnel is needed for a comprehensive national health service. Dr. Robb Smith overlooks the many factors in a salaried service that would save time and labour. So far as senior surgeons and physicians are concerned the time saved from travelling between hospitals would, alone, be enormous. One consultant was boasting to me a few days ago that he was on at thirteen different hospitals and visited them all in addition to his private practice. Technical assistance of every kind would also be organised and extended. Some increase in staffs there must be, but redistribution, organisation, avoidance of overlap and wasted time would make the necessary increase well within the bounds of the same space of time as the fundamental organisation of the service will in any case require. No-one has suggested that it will happen overnight. But if Robb-Smith were correct, then the 47% increase in doctors he advocates reveals how bad our existing service must be in some places and should strengthen our determination to replace it by an entirely new and better service

In so far as more doctors are required the solution lies in the plan adopted; but some lessons could be taken from that other planned medical service which has shown, to adopt Mr. Churchill's words, that no other form could have withstood such blows as Fascism has dealt it, the health service of the USSR. Dr. Robb-Smith mentions that a Russian doctor has a 5- or 6-hour working day; but in Russia the full plan was made and the shortage of doctors was got over by every doctor working two or even three such days until more students could be educated; medical education was made free to all who were suitable; and the number of doctors in Russia is now increasing at the rate of 25,000 per year (*Brit. med. J* Aug 28) A plan must include devices for the interim as well as ideals for the fully developed stage.

But it is surely no argument that because there are not enough of a certain kind of doctor we should hesitate to put into operation the greatest possible measure of the plan we have made. The Battle of Britain would not only have been lost but never even fought if Robb-Smith's conclusions were valid It is vital that we make a start now with every necessary plan so that in five years' time Dr. Robb-Smith and others will be able to write another analysis showing how good the service is compared with today, and how, as will always be the case with a health service, it can be made better.

Richmond, Surrey.   D STARK MURRAY.

SIR,—I have read Dr. Robb-Smith's article with considerable interest, but take strong exception to a gratuitous insult in it, which reads: "The real problem arises if there is a doctor whom no one or very few will choose [illegible] Perhaps he [illegible] put in cha [illegible] If this is th [illegible] doctor he would suggest be put in charge of a regional health centre, then all I can say is "God help the hospital or regional health centre." As Dr. Robb-Smith has made his suggestion for the disposal of the doctor who is not generally acceptable to patients, I fearlessly suggest that such a doctor be appointed a pathologist or pathological director.

ERNEST C. HADLEY,
Honorary Secretary of the Medical
Superintendents' Society.

"AVIATION MEDICINE"

SIR,—May I correct certain erroneous [illegible]

[illegible] congress of the South African Medical Association in 1938, I deprecated the lack of interest then taken in this field and demanded the immediate creation of an adequate organisation for research and teaching. Nothing however was done, and at the outbreak of the war no such service was available in this country. Then, at the request of various air schools, I was asked by the late Colonel R. F. A. Hoernle, OC Army Education, Union Defence Force, to take over the lectures on aviation medicine at various camps; for two and a half years I combined this with my duties as consultant in physical education.

After almost every lecture I had inquiries about suitable reading, without being able to give a satisfactory reply Armstrong's fine book was not written for flying personnel. Their need was my sole reason for accepting the publisher's invitation to print my lecture notes in book form. War conditions delayed its appearance and further knowledge has of course accumulated in the meantime; but I hold that it was and still is unnecessary to include in such a course of lectures all recent advances in aviation medicine. Even had this been possible, it would not have been permissible during the war.

I notice with satisfaction that you do not make any factual criticism of my book. Actually no single misstatement of importance has been brought to my notice by any reviewer, and I have heard from combatant officers and men in different theatres of war that the book has introduced them to a vital subject of which they had little or no knowledge. That my references "range from the *Psalms* to the *Saturday Evening Post*," instead of following the orthodox and more boring pattern which so many people admire but do not read, seems to have been widely appreciated.

Johannesburg. E. JOKL.

DIPHTHERIA IN THE INOCULATED

SIR,—The state of affairs to which Dr. Neubauer called attention in your issue of Aug. 14 (p. 192) is of importance also to anæsthetists and surgeons. If an inoculated child can present a diphtheritic throat indistinguishable from a simple tonsillitis there will be unrecognised cases among the child population, some of them suffering from toxic myocarditis. Such a child may be considered fit for tonsillectomy, when the tonsillar enlargement is simply due to œdema following the infection, or for some unrelated operation, when anæsthesia would be fraught with danger and chloroform likely to be disastrous. The condition of the heart muscle is so important in relation to induction of anæsthesia that a chapter on cardiology might well be incorporated in textbooks on anæsthetics; perhaps some simple exercise-tolerance test, to be carried out in bed or on a trolley, would give a danger signal. A blood-pressure reading by the anæsthetist might, Dr. Neubauer suggests, be of more value than the stethoscope.

Birmingham. J. W. RIDDOCH.

HOSPITAL POLICY

SIR,—A committee consisting of two representatives of the medical committees of each of the London undergraduate teaching hospitals has been formed with the object of coordinating the views of the medical staff of these hospitals. At a meeting on Aug. 17 the following resolution was passed.

> This meeting regards it as essential that freedom of expression in medical matters and hospital policy, and freedom of medical practice, be preserved in hospitals in any postwar reconstruction; and that a medical committee should be the advisory body to the governors of an institution on medical matters.

GEOFFREY BOURNE,
St. Bartholomew's Hospital.
(Chairman.)

W. D. DOHERTY,
Guy's Hospital.
(Hon. Secretary.)

WE welcome, very cordially, a new contemporary in *Transatlantic* published at 1*s.* by Penguin Books Ltd. and edited by Geoffrey Crowther from 110, St. Martin's Lane, London, W.C.2. The object is to help the British to a better understanding of American affairs and American life, and paper has been allocated to it for this purpose; but it is an independent British journal, enjoying no subsidy and suffering no control, and it will not paint the United States in brighter colours than sober friendliness dictates. "If we are not to succumb to our enemies," says the first editorial, "we must keep close to our friends." And "in the great issues of Civilisation *versus* Barbarism, of Freedom for the human spirit *versus* Regimentation for the human soul, of Welfare *versus* Power, of Butter *versus* Guns—on all these great issues, so long as they keep their faith, America and Britain will always be on the same side." Meanwhile *Transatlantic* finds time to be entertaining as well as sane.

Hospitals' Day in the London area will be held this year on Tuesday, Oct. 5. Suggestions and offers of service should be sent to the London Hospitals Street Committee at 36, Kingsway London, W.C.2.

Obituary

FRANCIS E. FREMANTLE

KT, OBE, DM, CHM OXFD, FRCS, FRCP, DPH, DL, M

Sir Francis Fremantle, who died on Aug. 26 in his 72nd year, was fourth son of William Fremantle, Dean of Ripon, and grandson of the first Baron Cottesloe. He was born in London, educated at Eton and Balliol College, Oxford, and qualified in 1897 from Guy's Hospital, where he edited the *Gazette*. After holding a series of house appointments at Guy's he went through the South African War as field surgeon, volunteered for plague duty in the Punjab, and was special correspondent of the *Lancet* during the Russo-Japanese War 1903–04. In 1902 he was appointed CMO for Herts, becoming chief school MO in 1908 and holding both posts until 1916, when he was retained as consultant. He lectured on public health and tropical hygiene at several London medical schools, and the Society of MOHs elected him their president. In 1902 he joined the Herts Yeomanry as surgeon-captain; he became sanitary officer East Anglian division and during the war of 1914–18 was DADMS (San.) in Egypt and Mesopotamia with the rank of lieut.-colonel RAMC (T). From 190 he was prospective Unionist candidate for Rotherhithe but on the eve of election in 1910 he was disqualified by a ruling, since removed, against MOHs and he first entered Parliament in 1919 as member for St. Albans, occupying the seat until his death. For 18 years he was chairman of the Unionist Health and Housing Committee and his other parliamentary activities were set out in our last issue by Medicus MP.

Elliott & Fr

This curriculum vitæ is the more remarkable because it was instinct with the desire for social service. From his youth he knew he would inherit a considerable estate (at Bedwell Park), and in his Oxford days he determined to enter politics; if he took good medical degrees he would be the better able to interpret medical problems to his political companions. He had no particular flair for examinations; passing them was for him hard work. And the assiduity with which he read the *Times* during his period at Guy's was the subject of some jest among his fellow students, with whom he was nevertheless popular. There was no jesting, however, about the trenchant letters from South Africa which appeared in the *Gazette*, for his exposure of the shortcomings of the Army medical services was a contributing cause to the inquiry which followed that war; he was indeed asst. secretary to the departmental committee charged with reorganising these services. His tenure of the county health appointment was indefinitely prolonged by the opportunities it offered him of planning the background of people's lives.

In his parliamentary life he accepted the doctor's mandate (to quote the words of a Chadwick public lecture he gave in 1937) to express the special experience of his profession and the knowledge of life in every phase of it and in every section of the community—both on matters of health and on those of general policy and administration. He regarded himself as in the long line of succession beginning with Dr. John Somerset physician to Henry VI, who was Chancellor of the Exchequer 1440–46. On the medical MP falls especially the privilege of dealing fearlessly with the awkward topics—sexual questions and marriage, betting, licensing, Sunday trading, and moral and ecclesiastical problems. As chairman for 18 years of what is now called the Conservative Social Services Committee something of the execution of this privilege may be given in his own words. "On Feb. 20, 1924, the committee met for the first time. In March I prepared a memo for them on building by collective enterprise, especially public utility societies. In May, Neville Chamberlain asked me for a memo on provision of hospitals. Lord Eustace Percy and Sir Ian Roberts prepared memos on a new housing policy, and we were largely occupied with amendments to Mr. Wheatley's housing and building materials bills. In 1925 we were concerned with LCC slum clearance, rent restriction, and contributory pensions, which Chamberlain and his henchman, Kingsley Wood, came twice or more to discuss with us. In each succeeding year we have met monthly, or oftener as required, mainly to deal with current legislation, and have had leading authorities from outside, as well as the Ministers concerned directly and indirectly, to talk to us and be heckled. We prepared amendments, put up speakers in debate in the Chamber, and encouraged local and individual [illegible] has started serious work on [illegible] ink it has done good work, [illegible] It is, however, surprising that the women MPs have hardly ever attended." Nurses and midwives do not come in this list, but Fremantle had much to do with improving their status and working conditions. For the Institute of District Nurses, writes its vice-chairman, he was always ready to give his help. "I wish," he adds, "there were more people like him."

Sir Francis Fremantle married in 1905 Dorothy, only daughter of Henry J. Chinnery, JP, of Fringford Manor, Bicester. They had one son.

FREDERICK JOHN CLEMINSON

M CHIR CAMB, F R C S

[illegible] lting aural surgeon to the [illegible] pneumonia at his home at [illegible] He was the first director [illegible] the Middlesex, opened in [illegible] his uncle, the late Thomas [illegible] retired from his extensive [illegible] the staff of the [illegible] e Heart Hospital [illegible] Ferens Institute, [illegible] him when in the following year the institute had to be closed on the outbreak of war. But his Essex home gave him opportunities for his chosen hobbies of ornithology and sailing. The equipment and the library of the institute, though not the building, have survived the blitz, its funds have been accumulating, and when it reopens after the war [illegible] first director.

[illegible] born in 1878, the son [illegible] Hull, and educated at [illegible] us College, Cambridge. [illegible] at University College [illegible] 1909 and taking the [illegible]

[illegible] who went up with him in 1897, "Clem soon showed his aptitude for medicoscientific subjects, and he got his double first in the natural sciences tripos without any undue exertion. Indeed, had single-minded application to work been necessary he might have missed it, for he wisely refused to become the [illegible] to his real genius [illegible] de and deep; he [illegible] — rich and poor, [illegible] le. After taking our degrees in 1901, we joined up as a coaching partnership in anatomy and physiology. We also took reading parties in the Easter vacations when we really worked hard, with extraordinarily pleasant intermissions for pl [illegible] congenial atm [illegible] in London, he [illegible] ones. As an example, in 1928 he arranged a little dinner for some of us who had worked together for Part II of the tripos in 1901—T. R. Elliott, R. Foster Moore, W. M. Mollison. We invited some of our lecturers—Gowland Hopkins, Walter Fletcher, C. S. Myers, and [illegible] successful evening it was."

[illegible] ested in the prevention of [illegible] management of children, [illegible] assistantship at the ear, [illegible] was confirmed by his appoin [illegible] made a special study of sinu [illegible] the subject of one of his rare [illegible] tions to the section of otology RSM of which he was one time president. At the section of laryngology he discussed headache associated with nasal disease and the applications of radium and radon in which he was much interested. He was more at his ease at the international club he helped to found at Groningen. But he was always concerned with doing rather than with speaking or writing. No surgeon ever gave more wholehearted service to his patients, and none was more beloved by them.

In 1906 he married Miss Sarah Smucker of Philadelphia, and he leaves her with one son and two daughters.

ATHELSTANE ILIFF SIMEY

M D CAMB, F R C P

Simey's death will be felt as a personal loss by his innumerable friends. For 23 years he was medical officer to Rugby School, where his outstanding achievements were the introduction of a substantial evening meal and the abolition of useless quarantine. He was born at Sunderland in 1873, youngest of the three sons of Ralph Simey, DCL, all of whom were educated at Rugby. Here he became head of the school. He went to King's College, Cambridge, with a classical scholarship, and took a first-class in the classics tripos before starting medicine. In 1901 he qualified from the London Hospital, where he stayed to be medical registrar, and he was also outpatient physician at Victoria Park before returning to Rugby in 1908. Farquharson and Dukes, his predecessors, had already established their fame as school doctors. Simey, soon after his appointment, advocated the substitution of a substantial evening meal for the customary bread-and-jam tea supplemented by private purchases. Wasteful, he said, and the growing boys who needed a good supper in the evening were not only those whose parents could afford to send hampers from home. Victory was not easy, and only after a few converts had tried the experiment and found that cooks [illegible] did the other house- [illegible] s the first school to [illegible] sh in them. Every [illegible] ich first made him [illegible] to quarantine boys exposed to infections in the holidays, while freely sending boys home at the end of term after exposure at school. He preferred epidemics of measles "little and often" rather than in bulk. His policy succeeded, and he was the real author of the regulations in the MOSA code which allowed the return to school of boys who had been exposed to infection if they were kept away from its source as soon as [illegible] ed with the safety-first met [illegible] has supported Simey. As a [illegible] he was if anything too care [illegible] enjoyed the *Punch* cartoon w [illegible]

Dean, Rugby

[illegible] served the Hospital of St. Cross with as much zeal as he served his school. He was its physician and radiologist, sometime chairman and secretary to the medical board, and spared no pains to nurture its rapid growth. The nursing staff there, as well as in the school sanatorium, recognised him for what he was.

When after 23 years devoted service to the school he felt the time had come to make way for a younger man Simey migrated to Exeter as physician to the Exmouth Hospital, but finding consulting practice too great a strain he built a house on the edge [illegible] the New Forest where his garden and the birds w [illegible] a perennial delight to him. His last [illegible] were spent at his cottage at Dockray, [illegible] Though he had left Rugby twelve y [illegible] Christmas passed but he wrote to all [illegible]

Nothing was too much trouble for him. He was an idealist, and his life was marred by disappointments. Perhaps he might have seen the new sanatorium built if he had been content with less and smaller rooms. His advocacy of pasteurisation fell upon dull ears. But he knew no malice and made no enemies. His devoted wife, who shared all his interests, will have the satisfaction of assurance that Simey's unobtrusive pioneer work in nutrition and epidemology has been copied and not found wanting.

Notes and News

CONTROL OF NURSES

EFFECT OF THE AMENDING ORDER

THE Employment of Women Order which came into force two years ago excluded nurses from the regulations controlling other women between 18 and 40. The Minister of Labour and National Service has now amended the principal order to include nurses in these age-groups except those who are members of the Civil Nursing Reserve. Under the new amendment (no. 1278, dated 31.viii.43) all nurses and midwives, after Sept. 20, must obtain their employment through the appointments office of the Ministry in the area in which they live. The aim is to prevent the overstaffing of hospitals (such as the large teaching hospitals) which can easily engage as many nurses as they require, and to encourage women applying for service in them to enter other neighbouring hospitals which are short of staff. They have always had this option, of course, but when refused by the hospital of their choice they are apt to give up nursing and turn to other occupation. Qualified nurses are now to be required to follow their own profession rather than take up other work, so that a nurse refused by one hospital will now either have to enter another in the area, or remain out of work (and out of pocket) until the Ministry sees its way to direct her into other employment. It is hoped that this narrowing of her choice of job will help to staff mental and fever hospitals, sanatoriums, and other institutions now lacking nurses.

The amendment offers various exemptions. Thus, though employers are required to engage nurses and midwives through an appointments office, hospitals and similar institutions will be freely granted certificates exempting them from this obligation in respect of nurses of the grade of ward sister and above (though the Ministry must ratify any appointments made); and also in respect of vacancies for student nurses and pupil midwives. Students will thus be able to go on choosing where they will train, as long as there are vacancies for them. In a hospital granted these exemptions the only grade affected by the new order would be that of staff nurse; and it is difficult to see any great advantage from the plan. Many teaching hospitals employ students in their final year of training as staff nurses, and these would presumably come under the exemption covering students. In sanatoriums and mental hospitals it is unfortunately rare to find state-registered nurses holding the appointment of staff nurse, or even of charge nurse (the equivalent of a ward sister in a general hospital). In any case qualified staff nurses form a relatively small proportion of the staff of a teaching hospital, and the gain to neighbouring hospitals from control of their employment seems likely to be slight.

Nurses engaged in private practice will be given permits to continue in their work provided they can produce evidence that they are employed for 10½ months in the year; no permits will normally be granted to women under 30. The amendment does not affect qualified nurses who have already given up their profession and taken other employment in factories and elsewhere; but these are being interviewed, and when they seem suitable attempts are being made to persuade them to return to nursing.

The Minister has also decided to put into operation the order requiring newly qualified midwives to practise their profession for a year. As a temporary measure, and because the shortage of midwives is acute, no practising or recently qualified midwife will be allowed to take employment other than midwifery for the next six months (until February, 1944); after that the position will be reviewed.

The disquieting aspect of the amending order is that it makes no attempt to integrate the nursing service or to plan it regionally. As it stands it may even have an adverse effect on recruitment. The general teaching hospitals can only take a limited number of students, and at present girls contemplating nursing, and finding themselves excluded from the hospital and type of training of their choice, are turning to other occupations. If they find that the choice of work open to the qualified nurse is also being restricted, they will have still less incentive to begin. A regional plan under which a nurse passed in rotation through the general and special hospitals of her area, as part of her routine course for the SRN, would not only help to solve the staffing and recruiting problems of the hospitals, but would give the nurse a wider practical training and would, we have little doubt, attract the qualified woman into those branches of nursing which she avoids at present largely through ignorance of their scope.

Naval Honour

The RNVR officer's decoration has been awarded to Surgeon Lieut.-Commander J. O. Clyde, MRCS.

Medical Casualties

The following casualties among RAMC officers have been announced:

Wounded.—Captain J. S. Montgomerie, MB ST. AND.

Prisoners of War.—Captain Arthur Barber, MD LOND.; Lieut.-Colonel H. C. Benson, MB EDIN.; Captain David Christison, MB GLASG.; Major W. H. Dowell, MRCS; Captain A. W. Frankland, BM OXFD.; Major P. B. Hanbury, MRCS; Major N. C. Lendon, B CHIR CAMB.; Captain J. S. McConnachie, MB ABERD.; Captain K. C. Matheson, MB GLASG.; Captain T. S. Protheroe, MRCS; Captain Louis Sefton, MRCS; and Captain R. G. B. Young, MB EDIN.

Dr. CHRISTABEL SYBIL NICHOLSON (née Eyre) has been released from Holloway prison where she has been detained under defence regulation 18B since May, 1940. At her trial held in camera the following year she was acquitted and taken back to detention.

ENDOCRINES-SPICER Ltd. now manufacture dehydrocholic acid, under the name of 'Chonex.' The Comptroller of Patents has suspended the right of the use of the trade mark 'Decholin' in their favour for two years.

Births, Marriages and Deaths

BIRTHS

CHATAWAY.—On Aug. 26, at Mombasa, E. Africa, the wife of Dr. J. H. H. Chataway, Colonial Medical Service—a son.

LE VAY.—On Aug. 28, at Oxford, to Dr. Marjorie Le Vay (née Cole), wife of Lieutenant A. D. Le Vay, RAMC—a son.

MITCHELL.—On Aug. 29, at Radlett, the wife of Dr. T. Carlyle Mitchell—a son.

SMITH.—On Aug. 25, the wife of Dr. Donald Bell Smith—a son.

SWANN.—On Sept. 1, in London, the wife of Surgeon Lieutenant G. F. Swann, RNVR—a son.

THOMPSON.—On Aug. 29, at Exeter, the wife of Major Deni Thompson, RAMC—a son.

MARRIAGES

CORCOS—BROOKSBANK.—On Aug. 17, at Nottingham, Michael Geoffrey Corcos, lieutenant RAMC, to Bettina Mary Brooksbank, SRN.

MCKENDRICK—GABRIEL.—On Aug. 27, at Ruislip, George Donald William McKendrick, BM, to Evelyn Gabriel.

WILLIAMS—KEENE.—On Aug. 21, at Karachi, Thomas Meuns Williams, lieut.-colonel IMS, to Chris Keene.

DEATHS

FRAZER.—On Aug. 31, Edward FitzGerald Frazer, FRCSI, of Brighton.

HUNT.—On Aug. 28, at Gloucester, John William Hunt, MB LOND., late of Colonial Medical Service.

JELLY.—On Aug. 28, at Lytham, George Aubrey Jelly, FRCSE, aged 71.

LEES.—On Sept. 3, at Worthing, Charles Archibald Lees, MRCS, aged 73.

O'NEILL.—On Aug. 24, Gregory John Lamb O'Neill, MB EDIN. of Sydney, NSW.

PASTEUR.—On Sept. 1, at Warwick Park, Tunbridge Wells, [illegible] Pasteur, CB, CMG, MD [illegible]

PAULLEY.—On Sept. 1, [illegible], Nathaniel [illegible] Paulley, MRCS, JP, for[illegible] Norfolk, aged [illegible]

SCOTT.—On Sept. 1, at Midhurst, Sussex, John Easton Scott, MB EDIN., aged 65.

The fact that goods made of raw ma[illegible] in short supply owing to war conditions are advertised in [illegible] as an indication that they are nec[illegible]

LOCAL THERAPY OF WAR WOUNDS

I. WITH PENICILLIN *

R. J. V. PULVERTAFT, M D CAMB, F R C P
MAJOR RAMC; OC CENTRAL PATHOLOGICAL LABORATORY, M E F

SAMPLES of the sodium and calcium salts of penicillin [illegible] ological Laboratory, Middle [illegible] of Prof. H. W. Florey. A [illegible] t a Scottish general hospital were treated with these reagents, with satisfactory results, which are here described.

As a preliminary the wounds were dressed by an aspirating device.

In the treatment of wounds with various reagents locally appli[illegible] wounds were often exquisitely tender and became more so as healing proceeded

In order to obtain a really clean surface for local applications, the apparatus here illustrated was set up (see figure) A is a stand, 7 ft. high with two arms B is a reservoir of fluid with a drip feed, thumb screw to adjust drip. C is a glass nozzle to apply fluid to wound. In these experiments, normal saline alone has been used, so as not to confuse the issue; but 0 1% electrolytic hypochlorite would probably be better. D is an aspirator, as fluid drips away from E a negative pressure is created in flask F, and thus applied to a curved applicator G.

Results have been excellent, deep pockets are readily explored, and surfaces quickly cleansed, the process is relatively painless, and painful points can be avoided. The method is similar to that of Tudor Edwards in empyema drainage, it is hoped to develop it further in general hygiene of wounds

As an irrigating fluid normal saline at 37° C. was found to be simple and painless, and deep pockets could be readily cleaned by its use In fact, employed by itself without any other reagent, the control of smell, and of the soiling of the bed and dressings, as well as the relief given to the patient, were of definite value. It seems essential that some such device should be used in conjunction with any local therapeutic agents, since it is of little use to float these on a sea of pus.

The first supply of penicillin was the sodium, the second the calcium, salt. In-vitro tests confirmed statements that the drug was highly bacteriostatic to gram-positive organisms, inhibiting *Staphylococcus aureus* in dilutions up to 1 in 1,000,000 or more; and that it was not bactericidal. Further it was found to be non-irritant to the rabbit's eye. It was poorly bacteriostatic when tested on *Ps. pyocyanea*, *P. proteus*, and *S. typhi*.

One ampoule of the sodium salt was found to be inert. The rest was employed in various ways, as a powder, as a spray, and as a wet dressing covered with soft-paraffin gauze. The liquid was always painless; the powder in one case caused pain for 30 minutes, radiating down the leg; in other cases the powder was painless. No deleterious effect was noted on wounds, but in 2 cases, when the calcium salt was injected intrathecally, severe reactions were noted Professor Florey had warned against such use, but it was employed because the cases were resistant to all other methods of treatment. The "standard solution" referred to in the text contained 100 mg. of penicillin in 16 c cm. of saline.

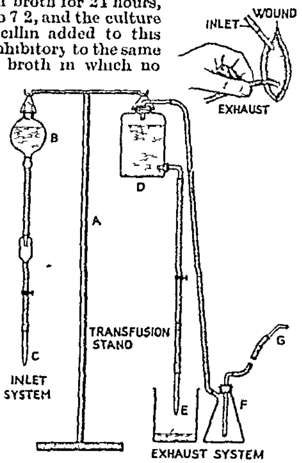
The effects of treatment are given in the table. In most cases there was a rapid and progressive diminution of gram-positive organisms, and much clinical improvement, in some [illegible] isms, far from [illegible] previously absen[illegible] e their presenc[illegible] ugs. However, gram-negative organisms in wounds, without pyogenic cocci, do not seem to be of much [illegible] few of the [illegible] tive, were [illegible] Unlike [illegible]

If pyocyaneus is cultured in broth containing that concentration, and the culture is then adjusted to a pH of 7 2 and filtered, this filtrate is still inhibitory to *Staph. aureus*; there is no evidence therefore that there is any breakdown of the drug by this common wound organism. A medium in which pyocyaneus has grown is not inhibitory to *Staph. aureus*

W[illegible] dium containing [illegible] ow in filamentous [illegible] the effect of the [illegible] l fission, but not [illegible] organisms; and films from wounds indicate that these organisms are phagocytised, and in this state are not culturable.

It was thought possible that a growing and subdividing organism might manufacture a substance stimulating further division, and that this hypothetical substance might overcome the inhibitory action of penicillin, of this there is no evidence If a staphylococcus is grown in broth for 24 hours, the pH adjusted to 7 2, and the culture filtered, then penicillin added to this filtrate is just as inhibitory to the same strain as it is in broth in which no previous growth has occurred.

No drug effective against gram-negative organisms was found, 1% acetic acid, often advised, was not found to be effective; neither was sodium mandelate, applied locally. Even succinyl sulphathiazole (sulphasuxidine), so effective by mouth in eliminating gram-negative organisms from fæces, was ineffective when applied to wounds of this group.



Aspirating device —Inlet system ordinary ME giving set will do with glass connexion Exhaust system all rubber tubing is best used with ¼ in. internal diameter (pressure tubing).

COMMENT

Since this series was completed, several other cases have been treated, most of them with the same results. Gram positive organisms have quickly disappeared, and clinical improvement has been considerable. On the other hand, in 2 cases of late and severe sepsis in compound fractures, an early disappearance of such flora was followed by a clinical relapse, and the organisms returned to the wound. It is true that the calcium salt of penicillin used, which was forwarded in bulk, may perhaps not have been equally potent throughout. On two occasions in-vitro tests of bacteriostatic value seemed to show a drop in titre, but the organisms isolated from these wounds were fully susceptible to the action of the drug in vitro.

A third [illegible] femur with sinus, infect[illegible] —showed no [illegible] thrice daily [illegible] into the sinus. A number of [illegible] locally without effect. Eventually a large sequestrum was removed and the wound healed.

The opinion was formed that penicillin is of real value in the control of infection by gram positive organisms It must be applied repeatedly, and those cases in which it was most often applied did best. It does not always eliminate organisms, perhaps because it cannot always get to their hiding places when externally applied

The war wounds which are most dangerous, from the point of view of later infection, are those of large muscle groups—e g, buttock wounds Anaerobic infection here is most dangerous, and penicillin appears to be effective in this group. It is suggested that in this class of

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* The second part of this paper, including the discussion, will appear in a forthcoming issue

CASE REPORTS

Case and date	Age, state of wound and progress	Treatment	Smear (S) and Culture (C)
CASE 1	Aged 23. Wounds of both thighs; lt. fractured femur	..	Not done
Aug. 30, 1942	Suppurating. Temp. 99–104° F.	Sulphanilamide 2 g. daily	,, ,,
Aug. 31	,, ,,	Sulphanilamide 3 g. daily	,, ,,
Sept. 1	,, ,,	Discontinued drug	,, ,,
Oct. 16	Copious creamy discharge; bed and dressings soaked in pus, foul smell. Bedsores; septic fever, gross cachexia, poor appetite, severe anæmia	Catheter inserted into sinus in lt. thigh; 4 c.cm. of penicillin (standard strength) inserted thrice daily	S: vast nos extra-cell. streps. C. hæm. streps. *C. hofmanni*, pyocyaneus
Oct. 17	Discharge less	Same; produced no symptoms	S: no cocci seen. C. pyocyaneus only
Oct. 19	Discharge less. Temp. settling	Same	No change
Oct. 20	Discharge less	Sinus in right thigh similarly irrigated	S. streps. +++. C. hæm. streps., pyocyaneus
Oct. 23	Rt. thigh, swelling much diminished. Lt. thigh, little suppuration. Temp. settling rapidly; gen. condition much improved	Same, pressure-sore treated with penicillin. rapid healing	S: rt and lt. gram-neg. bacilli only. C. rt. thigh, pyocyaneus; lt. thigh, proteus and pyocyaneus
Oct. 27	Catheters removed. Lt. thigh, almost healed Rt thigh, little discharge. Temp. settled; pt. comfortable; appetite good	No treatment	S: no cocci seen. C: no change
Oct. 30	Rt. thigh, much swelling. Loculated pus; discharged by pressure	2 c.cm. penicillin	S: streps +++; few cells C. hæm. streps.
Nov. 3	Both healed; no discharge. Complete recovery. Streps. disappeared from both wounds 24 hr. after start of treatment; gram-neg. bacilli unaffected, but did not prevent healing	No treatment	S: nil. C: nil
CASE 2 Sept. 1, 1942	Aged 33. Multiple bomb wounds; penetrating wound rt. parietal lobe of brain	Sulphonamide pack	Not done
Sept. 2–11	Infected. CSF: white cells 6270 per c.mm.; polys. 95%, Hb. 40%	Sulphadiazine 55 g.; sulphapyridine 31 g.	,, ,,
Sept. 21	Brain abscess opened; 8 c.cm. pus removed. Penicillin produced no symptoms	Sulphadiazine 50 mg. Penicillin to abscess cavity (solid); 50 mg. in solution injected into cavity through catheter	S staphs., streps. gram neg. bacilli C. hæm. *Staph aureus*; hæm. strep.; unrecognised gram-pos. coccus, *B. mesentericus*
Sept. 23	Wound healthy, 2 c.cm. of pus aspirated. CSF contains no penicillin. Pt. fit, talking coherently	2 c.cm. of standard penicillin injected through catheter; sulphadiazine contd.	S: few organisms; intracell staphs. only. C: hæm *Staph. aureus*, scanty growth; unidentified gram-pos coccus
Sept. 24	Wound healthy; 0·2 c.cm. pus aspirated. Catheter came out; treatment stopped. Pt. was recovering well but died on Oct. 29 from intercurrent extradural abscess, lumbar region. Autopsy: brain, no sign of recent damage or infection; no meningitis, considerable loss of tissue; defect sealed off by meninges.	2 c.cm. standard penicillin injected. Sulphadiazine contd.	S: no organisms seen. C. 2 colonies *Staph. aureus*; unidentified gram-pos. coccu
CASE 3	Aged 31. Gunshot wound of sacrum	..	..
Aug. 17, 1942	Vast tissue defect over sacrum; shell fragments in wound; copious stinking discharge. Not suitable for treatment, since probable duration of illness would absorb all available penicillin; case used as test of action on organisms	Penicillin standard solution, 100 mg.	S: many staphs, streps., diphtheroids, coliforms; few cells C: overgrown with pyo cyaneus
Sept. 18	Discharge much less; smell less offensive. Pt. and his friends commented on alteration of smell	Penicillin, 100 mg.	S: organisms greatly reduced, few staphs., diphtheroids or coliforms present. C: pyo cyaneus
Sept. 19	ISQ	Treatment discontinued as test	No change
Sept. 21	Immediate return of organisms. Wound stinking; profuse discharge	Penicillin, 100 mg.	S. staphs. ++++. C not done
Sept. 22	Much less pus; wound cleaner. Experiment shows control of flora by penicillin	End of test	S: staphs. much diminished C: not done
CASE 4	Aged 24. Thigh wound, chipping of femur	..	..
Oct. 27, 1942	Much pus, œdema	Penicillin, 50% standard, injected into sinus (ampoule tested in vitro and proved inert)	S. streps. +++; staphs clostridia. C: hæm. str hæm. *Staph. aureus*
Oct. 28	No effect on wound	Same	No change
Oct. 29	Foul profuse discharge. Treatment painful; shooting pain down leg: only case to react like this—? nerve injury	Solid penicillin, 100 mg. active sample inserted into wound	No change
Oct. 30	Remarkable change, no œdema; little pus, no smell. Immediate effect when active drug applied	Same	S: few organisms seen hæm. streps, proteus
Nov. 4	Improved	Irrigated with standard penicillin thrice daily	No change

CASE REPORTS—(*continued*)

Case and date	Age, state of wound and progress	Treatment	Smear (S) and Culture (C)
(*Case 4 contd.*) Nov. 5	Healing well. Nov. 7: treatment stopped; wound well advanced towards healing; evacuated soon after for convalescence	Irrigated with standard penicillin thrice daily	S: no cocci seen. C: 3 colonies hæm. streps., pyocyaneus
CASE 5	Aged 30. Multiple penetrating wounds, most severe in lt. calf muscles. Bare area 4 × 3 in; deep pocket		
Nov. 10, 1942	[illegible] ead": little [illegible] as in tissues [illegible] as gangrene, [illegible] attributed [illegible]	Standard penicillin spray after irrigation and cleaning	S: bacteria only; streps., staphs., clostridia; no cells. C: hæm. streps., hæm. *Staph aureus*; *Cl. welchii*, proteus
Nov. 11	Clean; no smell; little discharge; muscle red. Delirium much less	Same	S: few organisms. C: proteus; a few hæm. streps
Nov. 12	Profuse suppuration; tender; bleeds readily. (Temporary suppuration in a non-reacting wound after penicillin *noted several times.*)	,,	S: few intracellular cocci. C: no change
Nov. 13	Little discharge; pocket filling up. No delirium, pt much better	,,	S: a few cocci only. C: 6 colonies of *Staph albus*
Nov. 14	No change	,,	S: nil seen. C: sterile
Nov. 15	Gr [illegible]	Treatment stopped	S: nil. C: sterile
CASE 6 Oct. 24, 1942	Multiple wounds; severe comminuted fracture of humerus		
Oct. 29	Much muscle loss; profuse foul stinking pus, much slough. Great pain; v. toxic, pt. crying and groaning	Penicillin spray; standard strength; irrigation of wound; penicillin, 100 mg. daily	S: extracellular streps. + + + +. C: hæm. streps. + + + +; pyocyaneus
Nov. 2	Discharge less	Same	S: no streps. seen; a few intracell. cocci. C: a few streps.; pyocyaneus
Nov. 3	Wound granulating, little smell. Gen. condition much improved	,,	No change
Nov. 4	Bleeds readily, swelling and pain much less	Penicillin 50 mg.	S: orgs. fewer. C: few streps.; pyocyaneus
Nov. 5	Wound improved. Almost free from pain	Same	S: phagocytised cocci only. C: pyocyaneus only
Nov. 6–10	Continuous improvement. Nov. 10 arm set up in closed plaster; recovery. Note relief of pain from treatment	Continuous irrigation with 1/1000 penicillin; continuous aspiration	No change
CASE 7	Aged 25. Extensive wound, lt. thigh. No excess discharge		Not sterile
April 16, 1943	Dull, lifeless looking wound, no excess discharge	Gauze soaked in crude penicillin	S: pus cells + +, gram pos. cocci in mod. nos. C: hæm. streps., free growth
April 17	Wound seemed more healthy, no excessive discharge	Same	S: still mod. nos. gram-pos. cocci
April 18	Fairly profuse discharge; healthy looking underneath	,,	Gram pos. cocci, mod. nos., all intracell.
April 19	No change	Penicillin spray, on top of original dressing on surgeon's advice, to avoid discomfort to pt.	Gram-neg. bacilli
April 20	Pus collecting under dressing	Same treatment	No change
April 21	Dressing removed, little pus underneath	Penicillin gauze	,, ,,
April 22	No change	,, ,,	,, ,,
April 23	Slight serous discharge	,, ,,	,, ,,
April 24, 25	No change	,, ,,	,, ,,
April 26	No discharge; islands of epithelium forming in wound. April 29, pinch graft	,, ,,	,, ,,
CASE 8	Aged 34. Wound of spine with partial paralysis of lower limbs		
April 7, 1943	Large unhealthy looking buttock bedsore, with sharp deep "cliff edges," covering about 14 sq. in.	Penicillin spray	S: gram neg. orgs. in large nos. C: hæm. strep., free growth
April 9–16	All previous dressings done by ward staff; daily progress not recorded, sharp edges lost; only sl. serous discharge	,, ,,	S: gram-neg. bacilli in large nos. C: no growth
April 17	Still only slight serous discharge	,, ,,	No change
April 18	No discharge; attempt to tan over surface	Proflavine powder; covered with wire cage	,, ,,
April 19	Slight tanning on lt. side; little change on rt.	Proflavine powder	Not done
April 20	Lt. side tanned over; rt. side filled with pus aspirated	Penicillin, 1% in cavity and *P. notatum* filtrate gauze	S: mod. nos. gram-neg. bacilli

CASE REPORTS—(*continued*)

Case and date	Age, state of wound and progress	Treatment	Smear (S) and Culture (C)
(*Case 8 contd.*)			
April 21	No change	Penicillin, 1% in cavity and *P. notatum* filtrate gauze	S; no change
April 22	More profuse discharge from rt. side; lt. side doing well	Same	,, ,,
April 23	Still less discharge. Pt. feels more comfortable	,,	,, ,,
April 24	Much less discharge; granulation over wound	,,	,, ,,
April 25	Only slight serous discharge. Patient has slight temperature; culture made from suprapubic drainage	UVL ½ in. at 8 in.; penicillin after	,, ,,
April 26	Sl. serous discharge; granulating well. Temperature still raised	Penicillin gauze	S: no change. Urine C: *B. coli*, free growth
April 27	No discharge. Attempt to tan over surface again. Pt. recovered feeling in hips	2 : 7 diamino-acridine monohydrochloride	S: no change. C: pyocyaneus
CASE 9	Aged 23. Amputation lower ⅓ lt. leg	Sulphonamide, soft paraff. gauze	..
Mar. 16, 1943	Little discharge, but wound unhealthy with little areas of slough over surface	Gauze soaked in standard *penicillin*	S: mod. nos. gram-pos. cocci; a few gram-neg. bacilli. C: hæm. *Staph. aureus*, hæm. streps., coliform orgs.
Mar. 17	Slightly more discharge; few sloughs came away with dressing	Gauze and penicillin	S: gram-pos. cocci, mostly intracellular
Mar. 18	Fairly profuse discharge; wound healthier	Same	S: gram-pos. cocci +, all intracell.; gram-neg. bacilli ++
Mar. 19	Only sl. serous discharge; all sloughs have come away; surface of wound clean	,,	S: gram-neg. bacilli in large nos.
Mar. 20	Still only sl. serous discharge. Leg strapped to splint after treatment to keep extension	Gauze and *P. notatum* filtrate	,, ,,
Mar. 21	No change	Same	,, ,,
Mar. 22	Pt. fell out of bed and bruised stump; sl. bleeding, several clots of blood removed	,,	,, ,,
Mar. 23	Wound healthy; no discharge. Splint left off	,,	S: only gram-neg. bacilli
Mar. 24	No change	,,	,, ,,
Mar. 25	Sl. serous discharge. Pt. up for 2 hr.	,,	,, ,,
Mar. 26	No discharge; wound healthy	Treatment stopped	,, ,,
CASE 10	Comminuted fracture of lt. femur; extensive wound 6 in. long on inside of thigh; much pus coming from sinus at top and passing upwards to groin	Sulphanilamide, plaster of paris, and later proflavine	..
Dec. 31, 1942	Much discharge	5 c.cm. of 1% penicillin injected into sinus, and remainder of wound sprayed; covered with paraff. gauze	S: pus cells; mod. nos. short-chain gram-pos. coc C: hæm. strep.; hæm. *Stap aureus*
Jan. 1 1943	Less discharge; no smell. Less painful	Same	S: pus cells; gram-neg. bac and mod. nos. intrace gram-pos. cocci. C: hæm *Staph. aureus*, proteus
Jan. 2	Still less discharge	,,	S: pus cells; gram-neg. baci C: proteus, overgrowth
Jan. 3	Improvement maintained	,,	S: pus cells; a few intracellu gram-pos. cocci, and mod. n of gram-neg. bacilli. pyocyaneus
Jan. 4	Still improving. A similar wound on outside of thigh treated	Inside: same treatment. Outside: normal strength penicillin	S: inside, pus cells, gram-ne bacilli; outside, pus cell no orgs. seen. C: insid pyocyaneus; outside, co form bacilli, a few colonies
Jan. 5	Both wounds clean and healthy; no discharge		S: as before. C: colifor bacillus
Jan. 6	Healed without further incident	Treatment stopped	
CASE 11 Nov. 18, 1942	Tommy-gun bullet through lt. hand; fracture of metacarpus	Sulphanilamide and closed plaster	
Dec. 31	Two septic wounds on dorsum, one on palm. Hand much swollen; little finger movement	4 c.cm. of 1% penicillin injected into thenar space, and remainder of hand sprayed with normal strength penicillin	S: pus cells +++; gram-po cocci +. C: overgrowth proteus
Jan. 1, 1943	Great improvement. Swelling less, and pt. had a little use in fingers	Same	S: pus cells +++; mod. n gram-pos. cocci and gram-ne bacilli. C: *Staph. aure* proteus
Jan. 2	Improvement maintained	2% solution injected into thenar space	S: a few pus cells; gram-n bacilli ++. C: overgrowth
Jan. 3	Swelling gone	*Same*	S: *pus cells* +; mod. nos. gram-neg. bacilli. C: prote
Jan. 4	More movement in fingers. Sl. pain in hand	,,	S: scanty pus cells; no or seen. C: few colonies proteus
Jan. 5	Improvement maintained	,,	S: scanty pus cells; no or seen. C: sterile

CASE REPORTS—(*continued*)

Case and date	Age, state of wound and progress	Treatment	Smear (S) and Culture (C)
(*Case 11 contd.*) Jan. 6	Finger movement still improving	3% penicillin injected	No change
Jan. 7	Wound clean and healthy	Treatment stopped	C: sterile
Case 12	Multiple shell wounds, left upper arm. Indolent ulcers	Sulphanilamide and soft paraff. gauze	..
Dec. 31, 1942	No excessive discharge from ulcers, but all slow to heal	Sprayed with normal strength penicillin, paraff. gauze	S: pus cells ++; large nos. of gram-pos. cocci. C: hæm. streps.; hæm. *Staph. aureus*
Jan. 1, 1943	Vast change: edges of ulcers healthy looking; patient felt more comfortable; one ulcer had large "mushroom" growth	Same	S. scanty pus cells; mod. nos. gram-pos. cocci, mostly intracellular. C: hæm. streps.
Jan. 2	Improvement maintained	"	S scanty pus cells; a few gram pos. cocci. C. hæm. streps, a few colonies
Jan. 3	" "	"	S scanty pus cells. No orgs. seen. C sterile
Jan. 5	" "	"	" "
Jan. 7	All areas about to epithelialise	No further advantage from this treatment	
Case 13 Oct. 27, 1942	Multiple shell wounds, lt. thigh	Sulphonamide, paraff. gauze, later eusol for 2–3 days	
Dec. 31	Dirty-looking ulcer, diameter 1¼ in. lt. buttock; tender round edges, slightly undercut; foul smelling	Gauze soaked in normal strength penicillin applied	S pus cells +++; scanty gram-pos. cocci all extracellular. C hæm. *Staph. aureus*
Jan. 1, 1943	Much improved; edges flush with remaining tissue, surface healthier; little discharge; no smell	Same	S. scanty pus cells. Scanty gram-pos. cocci all intracellular. C: sterile
Jan. 2	Improvement maintained	"	S: scanty pus cells, no orgs. seen. C. sterile
Jan. 3	No change	"	" "
Jan. 4	No change. Pt. felt much better; no pain on walking	"	" "
Jan. 7	Wound unhealthy looking again	Same treatment, every 24 hours	S. pus cells +, gram-neg. bacilli. C: coliform bacilli
Jan. 8	Healthy-looking except for small area of dark skin round the edges	" "	S: pus cells +; no orgs. seen. C. sterile
Jan. 9	V. healthy-looking; some excess granulations	" "	S: scanty pus cells; no orgs. seen. C: sterile
Case 14	Gunshot wound, lt. thigh. Patella removed, fractured femur; large area of granulated flesh at top of thigh; small area of suppuration above knee	One skin graft	..
Dec. 31, 1942	Some discharge	Normal strength penicillin; paraff. gauze	S: pus cells; a few gram-pos. cocci. C: coliform bacilli
Jan. 1, 1943	Much less discharge; no other change	Same	S: pus cells; mod. nos. of gram-neg. bacilli. C: coliform bacilli
Jan. 2	Improvement maintained	"	S: pus cells; gram-neg. bacilli. C. coliform bacilli
Jan. 4	No discharge; bleeds freely when dressing removed	"	S: pus cells; no orgs. seen. C: pyocyaneus
Jan. 5	Still bleeds freely, but no actual discharge. Small area of mushroom growth forming at inner edge of wound	"	S: pus cells; few gram-neg bacilli. C: pyocyaneus
Jan. 6		Not treated	..
Jan. 7	No effect after being left for 48 hr.; no discharge, no smell	Treatment resumed	S: few pus cells; few gram-neg. bacilli. C: pyocyaneus
Jan. 9	Wound surgically clean	Same	S: scanty pus cells; no orgs. C: sterile
Jan. 10	Wound v. healthy	No further advantage from this type of treatment; for further skin graft	
Case 15 April 16, 1943	Empyema cavity discharging. Long drainage tube	*P. notatum* culture filtrates, 10 c.cm. injected into cavity for 2 hr. daily before water drainage	S: gram-pos. cocci in chains and pairs; pus cells +++
April 17	Difficult to assess amount of discharge because of method of draining	Same	No change
April 18	Pt. felt no ill effects from penicillin	"	Gram-pos. orgs. now mostly intracellular; gram neg bacilli numerous
April 19	Temp. slightly raised	"	S: no gram-pos. orgs. left
April 23	Hardly any discharge. Long tube replaced by small tube, changed daily, draining directly into dressing	"	..
April 24	V. little discharge	"	..
April 25	..	Treatment finished	S: gram-neg. bacilli only

work, and in brain surgery, it may prove of particular value.

It has been thought wise to filter penicillin solutions through a Seitz filter, since the drug is not bactericidal, and there is a possibility of the bulk powder harbouring organisms if the container is often opened.

SUMMARY

A number of cases of infected war wounds have been treated with the calcium or sodium salts of penicillin (Florey), and 15 of these are recorded.

Within 24 hours there was a uniform and almost complete drop in the numbers of gram-positive organisms, including clostridia, staphylococci, streptoccoci and corynebacteria.

Gram-negative organisms were not affected. Therapeutic results were excellent.

The solid drug was introduced into a cerebral abscess cavity without deleterious effect.

A few experiments with *Penicillium notatum* culture filtrates, made locally, gave satisfactory results.

THERAPEUTIC USES OF THORIUM-X

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THORIUM-X is a short-lived radio-active metal (atomic weight 224). Its salts can be isolated by a complicated chemical process from thorium minerals. It is the second of a series of disintegrating elements beginning with thorium, thorium-X, thoron. The half-life period of thorium-X is 3·65 days. Thorium-X emits an alpha ray and then decays to thorium emanation (or thoron), a gas of atomic weight 220. Thoron in turn emits an alpha ray and its further decay products emit alpha, beta and gamma radiation. The insidious danger from radio-active substances giving off gamma rays is only too well known. But 99% of the total energy emitted by thorium-X is made up of alpha radiation. This will produce its effects long before any damage from gamma radiation can result, so that danger from the use of thorium-X can hardly exist theoretically; practically, freedom from danger has been established by Lomholt in experiments carried out on himself as long ago as 1920 (see Lomholt 1923 and 1936).

Compared with radium, whose half disintegration period is 1700 years, thorium-X is vastly more rich as a source of alpha rays. Alpha rays have a very feeble penetration—they are absorbed by a layer of paper of postcard thickness.

The metal thorium-X is an isotope of radium and belongs to the alkaline earth series. As one might expect, therefore, it is reasonably easy to manipulate chemically. The salts, as well as the element, are radio-active and are available in soluble and insoluble forms. Their richness in alpha rays is dependent on the rapid disintegration, which, however, is in some ways a therapeutic inconvenience. The power, in electrostatic units, of a solution containing thorium-X must be accurately predetermined for a given hour. It will be weakening all the time, so that therapeutic application must be made without too much delay.

Expense has also been advanced as an objection. The cost of 1 c.cm. of a solution containing 1000 electrostatic units is about ten shillings. But with this quantity several patients can be treated. The cost is thus not much greater than that of dispensing ointments to them all, and is incomparably less than X-ray treatment for them all, if capital outlay is included.

Thorium-X can be conveniently applied to the skin, either suspended in varnish dissolved in amyl acetate, or in solution in n-propyl alcohol. In the former instance the amyl acetate dries off and leaves the thorium-X contained in the varnish accurately applied to the area which it is desired to treat. The thorium-X will be more or less closely in contact with the skin, according to its distribution in the varnish and the thickness of the application. Where an alcoholic solution is used the alcohol dries off, leaving the thorium-X in contact with the skin, into the superficial layers of which some of the metal is possibly carried. Experiment on normal skin tends to show that a stronger effect obtained when an alcoholic solution is used.

When thorium-X is applied to a square centimetre of surface of the front of the forearm, at a strength of 1000–2000 electrostatic units, a sharply defined square of erythema will appear after a day or two. The area is slightly œdematous and is hypersensitive. The reaction lasts for about a month and is succeeded by a deep pigmentation. The pigmentation may persist for a year or more. The intensity of the erythema and pigmentation varies greatly in different parts of the body. There is much less reaction on the extensor surfaces than the flexor, on parts such as hands and face normally exposed to the air, and on the scalp. This is therapeutically fortunate. It is also fortunate that when application is made, not to normal skin but to a dermatological lesion, pigmentation is relatively mild and of short duration.

Thorium-X was first used at St. Bartholomew's Hospital by Dr. F. Jacobson, who had it sent by airmail from Berlin at his own expense. Later in 1938, Dr. A. C. Roxburgh persuaded Messrs. Derby and Co., specialists in rare metals, to prepare and standardise solutions at their laboratories. Messrs. Derby and Co. placed a weekly supply of thorium-X at the disposal of the hospital free of charge, and this they continued to do for four years, in spite of several interruptions due to enemy action. The clinical investigation was conducted on the first fifty cases by Dr. Jacobson. The work unfortunately was interrupted by the outbreak of war for several months. Subsequently, Dr. Jacobson being engaged on other duties, the clinical investigation devolved on the writer. Over 250 cases in all have been treated, some at St. Bartholomew's Hospital, some at St. John's Hospital. In a number of instances results were inconclusive: patients ceased to attend, interfered with controls, or proved unsuitable for report for a variety of medical and non-medical reasons. In the following cases the facts ascertained appeared to be definite.

ALOPECIA AREATA

The first case of alopecia arenta treated was a man aged 25, suffering from a circular bald patch the size of a two shilling piece. Half of the patch was painted with varnish three times at weekly intervals. A fortnight later, the area painted was covered with new hair, which soon after was fully grown. The other semicircle only became covered with hair after an interval of 2 months.

A woman of 47 had an oval patch of alopecia on the fronto-parietal region, 4 in. long by 2 in. wide. There were no exclamation-mark hairs. A cross ½ in. wide was painted on the area at weekly intervals. At the end of 6 weeks, new pigmented hair was growing in the area corresponding to the cross. It was many weeks before the remaining triangular areas filled in.

A man aged 26 was suffering from severe alopecia of the scalp: there were only a few hairs here and there; eyebrows, moustache and beard hairs were completely absent. Two squares on the parietal regions were painted with thorium-X in varnish, and in addition the inner half of the right eyebrow and the outer half of the left eyebrow were treated At first there appeared to be no effect, but after some months hair grew on that half of each eyebrow which had been treated, and hair began to grow on the scalp. On the scalp, however, it was not possible to make out any relation between the areas which had been treated and the regions in which hair was growing. The scalp became extensively covered in the course of the next few months, though sparsely. Growth of eyebrows continues to be limited to the halves treated with thorium-X.

A girl aged 11, with almost total alopecia, including alopecia of the eyebrows, was treated. One inch squares were painted on the parietal and occipital areas at weekly intervals for 8 months. Hair finally began to grow in the areas painted, and later all the scalp became irrgularly and rather sparsely covered. The eyebrows had also been painted. Considerable erythema occurred on these, but there was no growth of hair. Erythema does not develop easily on the scalp, and pigmentation is correspondingly less than on the trunk and limbs.

Success was achieved in several other cases of alopecia areata. In all, 35 cases were treated and observed at length. There was no result whatever in 4 cases of total alopecia, cases with large irregular patches with numerous exclamation-mark hairs, and little if any, improvement in alopecia of beard and moustache areas. (New hair growing under thorium-X tends to grow pigmented at once.)

The conclusion arrived at is that thorium-X has a well-marked influence in those cases of alopecia areata where there is already some tendency to spontaneous recovery. There may yet be no external evidence that spontaneous recovery has started; in fact, such recovery may be still distant, or might even never start without the stimulus of the alpha rays. In those cases where the immediate prognosis is obviously bad, it is advisable to avoid using thorium-X: the patient might ascribe the unfavourable course of the disease to the treatment, and it is possible that he would be right

CAVERNOUS NÆVI

A number of small cavernous nævi were painted with thorium-X in varnish [illegible] Some showed a superficial [illegible] ency to ulceration; when hea [illegible] so that the bluish nævus was a little less obvious than before But the main nævus was unaltered. It was concluded that the surface application of thorium-X has no value in the treatment of cavernous nævi. These nævi can be successfully dealt with by excision or by the application of radium (Finzi 1935 and 1936) In many spontaneous thrombosis and disappearance occurs.

NÆVUS FLAMMEUS

Thorium-X in varnish or alcohol will be successful in the treatment of selected cases of nævus flammeus, but it is necessary to make a clinical distinction in the main group.

Type I.—There is a bright red area, in most cases sharply defined. It is of variable size, but usually is rather extensive, covering a large part of one side of the face. One side of the nose is often affected and there is some te [illegible] across the middle [illegible] cases were treated. [illegible] orium-X in varnish [illegible] le noticeable effect. Treatment was ultimately abandoned in all cases.

Type II.—The nævus is more diffusely distributed on the face, some areas being perhaps quite separate from others The nævus is bluish-red and the margins are not well defined. Three cases of this type were seen and treated All three were in infants and all were much improved, if not completely cured.

Intermediate types—Gradations exist between type I and type II Success will be obtained in proportion as type II is approached.

A girl aged 12, suffering from a bluish red nævus affecting the chin and lower lip and with moderately defined margins, has been under treatment weekly for 8 months The nævus is still obvious, but has become a great deal paler The serious cosmetic misfortune of such a lesion makes any treatment that helps at all of inestimable value

In type II there is considerable tendency to spontaneous disappearance; in the intermediate type, less In both, alpha radiation may make just the difference required to initiate absorption. Since no other satisfactory treatment is known, it is particularly fortunate that thorium-X therapy is available for the treatment of at least the milder types of these nævi. The results confirm the observations of Prosser Thomas (1939), who has treated a large number of cases of nævus flammeus at St. Thomas's Hospital

TINEA OF THE NAILS

In 1939 a patient, in whom three finger nails on each hand were affected with ringworm, presented herself at St Bartholomew's Hospital Fungus was demonstrated microscopically. [illegible] Dr. Jacobson with thorium X, 1000 [illegible] r 4 months At the end of this time [illegible] coming normal It finally became [illegible] as remained so since. In 1940, the [illegible] tions the nails were unaltered A change was made to thorium X in alcohol, but again without effect Treatment was abandoned after 3 months of weekly applications

In a second patient treated by Dr Jacobson, five out of ten fingers were affected. Complete success was obtained in all.

These two examples show that thorium-X in alcohol will cure at any rate some cases of ringworm of the nails. The following instances show that only some respond to treatment, and these are not very many.

[illegible] years. [illegible] wsley [illegible] Dr I. Muende and Dr Bernard Green The patient was treated first with fourteen weekly applications of 2000 units of thorium X in varnish This had no effect It was followed by twenty applications of thorium X in alcohol, the finger nails being covered with strapping for two or three days after each treatment with the alcoholic solution There has been no result whatever from all this treatment, and after 16 years' regular attendance at St John's Hospital, the patient has finally made up her mind to seek specialist advice elsewhere

Two more patients have been treated for tinea of the nails at St John's Hospital, both with thorium X 2000 units in 1 c cm of alcohol In one patient there was no effect, but in the other, a man, who has been under treatment for 4 months, the nails appear to be growing up normal at the time of writing.

At present, the conclusion to be drawn is that treatment of tinea of the nails with thorium X should be tried, but that success is uncertain. It seems reasonable to hope that only a modification in technique is required to produce completely satisfactory results.

LICHENIFICATION

The treatment of patches of lichenified skin by means of thorium-X in varnish immediately gave encouraging results and over fifty patients were treated. As in alopecia areata, a treated area can readily be compared with another area either not treated or treated by other means on the patient himself, in most instances in one and the same patch of lichenification

A woman had a patch of lichenified skin on the inside of her thigh It was about 4 in × 3 in, the edges rather sharply defined, the surface uniformly thickened and greyish in colour. Treatment was instituted by painting on thorium X 1000 units in varnish as a band an inch wide across the patch Improvement occurred after two or three weekly applications, as regards both symptoms and physical signs After further applications the band became a deep plum colour. On palpation, it was obvious that the darkened area was depressed below the untreated lichenified areas, so that a shallow valley ran transversely across the patch Paroxysms of pruritus continued in the untreated areas but had almost ceased in the thinning area To some extent, itching had been relieved on the whole patch Treatment with thorium X on the transverse band was suspended and transferred to one of the untreated semicircles left, this now followed the same course that the transverse band had done The remaining semicircle was given a few doses of X rays, to which it readily responded.

Observations such as this were repeated with variations [illegible] a recent seborrhoeic, occupational or other dermatitis. In the latter type, progress to normality was relatively more rapid. In some instances, relief of itching was almost immediate, as sometimes follows X-ray treatment. Generally speaking, X rays in doses of ¼–½ Sabouraud Noiré pastille work a good deal more rapidly than alpha rays, but not always.

A woman of 60 had a patch of lichenification in the occipital area, just inside the hair margin The area was 3 in across by 1½ in vertically It was as heavy a lichenification as one can meet with. Beneath the psoriasiform, scaly surface was a deep thi [illegible] que, scarcely movable [illegible] This was treated [illegible] from ¼ to ½ pastille, [illegible] There had been improvement and at times complete relief of itching. But pruritus continued to recur, cumulative X ray dosage was becoming dangerous, it was decided to try the effects of thorium-X 2000 units in varnish Relief from symptoms was immediate and has been maintained. After five weekly applications, there was a greater change in the physical signs than had ever been seen in any period of X-ray treatment. With further fortnightly applications, the skin has become nearly if not quite normal.

Lichenification in the suboccipital region in women of middle-age is a common and obstinate condition. X rays almost always relieve symptoms for a time, but relapses or incomplete cures are frequent in spite of repeated applications of X rays. Thorium-X is therefore a valuable addition to the therapeutic agents at one's disposal.

In most cases of chronic dermatitis, the chief physical abnormality of the skin which develops is lichenification. Thorium-X may thus be expected to be of use in at least some stage of most cases of chronic dermatitis.

LICHEN PLANUS

The success obtained in lichen simplex suggested the trial of thorium-X in lichen planus. A patient was selected in whom the disease was neither acute nor chronic but of intermediate type, and in whom there were patches on each wrist of similar appearance, and therefore suitable for a controlled test. The result was disappointing. Treatment in a few other cases also failed or produced improvement of little practical value.

PSORIASIS

The successful treatment of psoriasis has been recorded by almost all writers on thorium-X, so that it seemed unnecessary to put it to the test very extensively. But some ten cases were treated and some facts were noted. Most important of all, it was found that applied over the white scales of the patches, thorium-X was without effect of any kind. This might be expected, for alpha rays have so feeble a power of penetration that they are almost completely absorbed in the scales themselves.

The following ointment was prescribed.

℞	Hydrarg. ammon.		gr. 10
	Acid salicyl.		gr. 10
	Liq. picis carbonis		min. 60
	Paraffinum molle	ad	1 oz.

This was to be rubbed well in to all patches every night for a week and washed off in the morning. At the end of the week, scales were absent or nearly so. Thorium-X in varnish was then applied to, say, one arm, and selected patches were treated with thorium-X in alcohol. Patches elsewhere continued to be treated by ointment and bathing. Thorium-X was applied once a week for a few weeks. It soon became obvious that places treated with thorium-X were doing better than those to which ointment only was being applied. Where ointment only was used, scale formation was kept down, but scales re-formed as soon as the inunction was given up. Where thorium-X was used, erythema disappeared, the patches became whiter than the surrounding skin, and scales ceased to form at all. Allowances had to be made for the variable course of psoriasis in different patients and at different times in the same patient. Taken as a whole, the claim made by Nagelschmidt (1932), Scholtz (1937) and Prosser-Thomas (1939), that thorium-X has considerable value in the treatment of psoriasis, was confirmed. The alcoholic solution gave better results than the varnish.

SYCOSIS BARBÆ

Sycosis in all its forms is notoriously resistant to treatment, and is a severe test for any therapy. It is usually symmetrically distributed on the beard area; the conditions are therefore ideal for comparing the side treated with the other side not treated or treated by other means. The patients lend themselves well to experiment, being young and interested as well as disappointed with previous efforts to get cured. Fourteen patients chosen as suitable for trial attended regularly till a decision was reached. Thorium-X in alcohol or in varnish was applied to one side of the chin or jaw or moustache area once a week or once a fortnight for several months. In every case there was improvement, which could be ascribed without hesitation to the thorium-X. Where there had been erythema this was reduced and where there had been follicular pustules these diminished in number and in some instances disappeared. But in scarcely any case could there be confidence that the condition was cured. At best there remained some degree of erythema or an appearance of instability of the skin suggesting that a relapse was not unlikely at some future date.

When one side treated with thorium-X was compared with the other side treated with X rays, the latter won easily: the side treated with X rays tended towards normality faster than that treated with thorium-X. But relapses after X-ray therapy when all physical signs have disappeared are well known, and X-ray treatment cannot be continued for long without danger, whereas thorium-X appears to be harmless.

CONCLUSION

Thorium-X is a valuable agent in the treatment of alopecia areata and psoriasis.

It is likely to be useful at some stage in all forms of subacute and chronic dermatitis, particularly where there is lichenification. It sometimes proves superior to X rays in such cases.

Encouraging results were obtained in the treatment of ringworm of the nails and sycosis.

Thorium-X appeared to be without effect on any but purely capillary nævi. In these good results were obtained, provided the nævus was not too dense. There being no other good treatment available in this serious disfigurement, thorium-X may justly be said to be invaluable in selected cases of capillary nævus.

I am indebted to Dr. A. C. Roxburgh for his encouragement and advice, and at St. John's Hospital to Dr. Bernard Green for his assistance and valuable suggestions.

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ACTION OF NICOTINIC ACID ON CARBOHYDRATE METABOLISM

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The influence of a vitamin-free diet on carbohydrate metabolism was already suspected by Funk and von Schonborn in 1914. In 1937 Martin found a high degree of insulin insensitivity in depancreatised dogs, depriv of the vitamin-B complex. Despite previously adequat amounts of insulin, their blood-sugar became elevate after 5–7 weeks, and intense glycosuria develope Increasing doses of insulin corrected this state for a tim but later even eight times the dose proved insufficie to control the glycosuria. In two of these experimen the disturbances could be overcome by injections vitamin B_1 and B_2. Vitamin B_1 alone was ineffecti but vitamin B_1 and lactoflavin were effective; lact flavin alone was not tried. Martin refers to the observ tions of Schroeder, that in diabetics generally the vitam requirement is greater than normal. He also cites th observations of Collazo and Pi-Suner Bayo, whic indicate that in normal animals deficiency of vitamin leads to disturbances of carbohydrate metabolism an diminished insulin activity. Martin concludes that th action of insulin apparently depends on the presence factors comprising the vitamin-B complex. At presen the evidence of the therapeutic value of the vitamin- complex, or any of its constituents, in diabetes is con flicting, though it suggests that the diabetic organis may require more of these vitamins than is obtained a mixed diet. These and similar observations form th basis of the present investigations, which were begun be cause of reactions after the administration of nicotin acid.

In treating a large series of cases of arterial diseas of the heart and lower limbs with intravenous injectio of 0·05% nicotinic acid in saline no reactions were see at first, when a solution containing 5% or 10% of dextros was used, but when the dextrose was omitted a viol and long-lasting rigor occurred during or after th injections in al [illegible] ffering from diabetes [illegible] ons in diabetics was [illegible] ctions produced a wel [illegible] ement in carbohydra [illegible] estimations were therefore carried out during and after injections. In 8 non-diabetic patients the blood-sugar was considerably depressed by the injections, and a rigor began shortly *after a pre-coma level of 18–40 mg. per 100 c.cm.* was reached. Hence it was evident that nicotinic acid interfered with the mechanism for buffering the blood- [illegible] The rise in blood- [illegible] lue to liberation of [illegible] hepatic glycogen. [illegible] -gely concerned with *the action of nicotinic acid on carbohydrate metabolism,* and its relationship to insulin.

Methods.—Blood sugar estimations were made by Maclean's method. Patients and volunteers followed their usual restricted or unrestricted dietary regime until the night before the tests began. They remained fasting on the morning of the test In order to exclude as far as possible any difference in reaction, they received, for two days before the tests, a diet equal in amount and composition, and remained in bed in the morning until the tests began, to avoid muscular exertion or changes in temperature

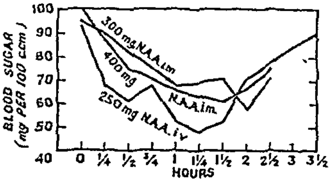

Fig 1—Average response of 9 subjects to 300 and 400 mg. NAA intramuscularly and 250 mg intravenously.

Nicotinic acid in doses of 100–300 mg. produces signs of vasodilatation in many patients This effect is almost eliminated by the use of nicotinic acid amide, and for this reason NAA [illegible] experiments, or demonstrate phenomena which have been observed on one occasion only

BLOOD-SUGAR DEPRESSION CURVE

Fig. 1 illustrates the average blood-sugar response of 9 healthy adults to the intramuscular injection of 300 and 400 mg. NAA and the intravenous injection of 250 mg. Apart from flushing of the face at 1¼ hours, and a feeling of tiredness at the end of the test, no untoward reactions were seen. Curves such as these have been recorded in a dozen volunteers, and the results obtained were almost the same in every test. The dose of NAA required to produce the maximum effect is difficult to define. In these 12 volunteers, the doses were approximately 1–6 mg per kg. body-weight. An intravenous dose of 250 mg. seemed to produce the greatest depression of the blood-sugar

Interpretation of these curves is necessarily difficult, because all the figures depend on the rate of removal of the blood-sugar. Variations in this rate may be caused in several ways, but there are two main alternatives. The mechanism by which sugar is abstracted from the blood may be rendered more effective, so that in response to the administration of NAA sugar is removed more rapidly and [illegible] r normal conditions. [illegible] become more efficient [illegible], then the abstracting mechanism is dependent on the presence of nicotinic acid. If the second alternative is right—and the depression of the blood-sugar appears to support this view—then the effect obtained is similar to that of an *injection of insulin;* this possibility has been further investigated.

EFFECT OF NAA ON ARTERIOVENOUS DIFFERENCE IN BLOOD-SUGAR

Fig. 2 demonstrates the changes in glucose content *of arterial and venous blood after the administration of* 400 mg. NAA. The A-V difference was heightened throughout this test. At 30 minutes the arterial blood-sugar has fallen 15 mg. per 100 c cm. but the venous has dropped 37 mg. The A-V difference increased therefore by 22 mg, a figure which is unusually high.

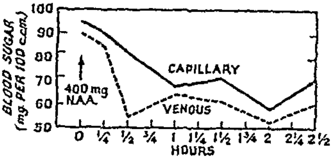

Fig 2—Arterial and venous blood sugar after intramuscular injection of 400 mg NAA.

There is much diversity of opinion about the arteriovenous difference in blood sugar. The facts which are generally acknowledged are these. In normal people *the postprandial blood-sugar is usually higher in arterial* than in venous blood, but in the fasting state the sugar content of the two bloods may be almost identical. In moderate diabetes the divergence between the arterial and venous blood is diminished, and in severe diabetes [illegible]

A-V difference was entirely an [illegible] content of the body, but later [illegible] the difference as an expression [illegible] our determinations of blood sugar were made fasting, when the blood-sugar concentration in the arterial is not much higher than in the venous blood, we may say that the action of nicotinic acid is to increase insulin activity, if we accept the view that the A-V difference at any specific time is a measure of active insulin then present in the tissues.

EFFECT OF NAA ON ACTION OF INJECTED INSULIN

To establish a further relation between nicotinic acid and insulin, they were given first at the same time, and then at intervals of 5, 10, and 30 minutes. It at once became evident that simultaneous administration of 2 units of insulin and 60 mg. of NAA was too powerful a combination, except in less sensitive persons. In sensitive subjects any effect which NAA might have had on the action of insulin was obscured by the rapid changes in blood-sugar The best effect was obtained when NAA was given 30 minutes before the injection of insulin. In less sensitive subjects the combination of [illegible] NAA produced [illegible] 3 non-diabetic patients to 60 mg. NAA and 2 units of insulin For comparison the response to 2 units of insulin alone is also shown The latent period which always follows an injection of insulin is so shortened that it could not be measured. The rate at which the blood-sugar is depressed, as well as the duration and degree of the depression, is also much increased. Under the conditions of these experiments, therefore, the action of intravenous insulin is enhanced.

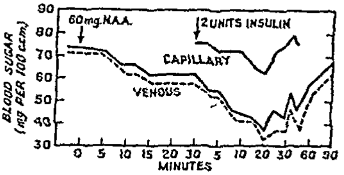

Fig. 3—Average response of 3 subjects to 60 mg NAA and 2 units of insulin.

One may regard the nicotinic-acid depres- [illegible] of an injection of insulin is a rise of blood-sugar to 3–10 mg. per 100 c.cm. above its original level. This rise also occurs when crystalline insulin is used (Young 1938). It probably reflects the response of opposing forces to the hypoglycæmic action of insulin. Unlike insulin, the injection of small [illegible] a rise in blood-suga [illegible] a disappearance c [illegible] required for this varies according to the dose. Figs. 3 and 4 illustrate the immediate response to NAA.

Increasing the dose of NAA shortened the time in which the A-V difference disappeared to seconds; a further increase caused a reversal of the A-V difference, and subsequently hyperglycæmia. Fig. 4 records the average response of 3 non-diabetic patients to an intravenous injection of 450 mg. NAA. In the first 5 minutes there is a moderate rise in blood-sugar following the reversal of the A-V difference. The situation is restored after 30 minutes. By an hour later the opposing mechanism has gained more control, until it is absolute after 2½ to 3 hours. At this time there is intense hyperglycæmia, the blood-sugar being raised to over 400 mg. per 100 c.cm. In one test it was too high to be measured. None of the volunteers experienced any ill effects. There was no glycosuria as long as they remained fasting, but glycosuria occurred after a meal. This might be compared with the action of an extract of the anterior pituitary gland, which will cause glycosuria in a fed but not in a fasting animal.

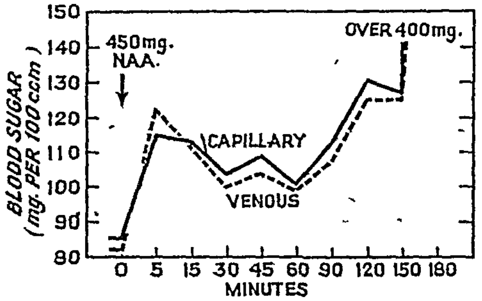

Fig. 4—Average response of 3 subjects to intravenous injection of 450 mg. NAA.

ADMINISTRATION BY MOUTH

The clear watery solution of nicotinic acid amide, which has an agreeable taste, is readily absorbed by the stomach and intestine. Administration by mouth acted far better than parenteral administration, probably because the NAA is carried direct to the liver via the portal vein. The effect of the watery solution however lasted only 2–3 hours. In some cases absorption was so rapid that the anticipated result did not last long enough or was too strong. In consequence it was necessary to find a preparation which was more slowly absorbed, and hence slower but more prolonged in action. A simple enteric coated tablet made the compound less soluble and generally more useful than the watery solution.

Fig. 5 shows the effect of a tablet containing 500 mg. NAA. It produced a sharp depression of the blood-sugar in the first 15 minutes. This effect was interrupted by a meal of 50 g. of carbohydrates. Two hours later the effect of NAA again became noticeable, and continued for another 2½ to 3 hours, in which time hypoglycæmic symptoms developed.

CLINICAL APPLICATION

Because failure of insulin action has been repeatedly reported, and the absence of an essential factor other than insulin has been suspected as a cause of disturbances in carbohydrate metabolism, it seemed important to test the efficacy of nicotinic acid in diabetes. A limited trial has been under way for six months with a group of 12 patients, all of whom belong to the type of elderly diabetics who are usually insensitive to insulin, and seldom liable to ketosis. From the experience gained, it is certainly possible to give large amounts of NAA over a long period without inconvenience or injury to the patients.

The first case reported below is one of 3 patients who responded so rapidly to NAA, and showed no further sign or symptom of diabetes after a few days' treatment that without previous observation the diagnosis would have been much in doubt. In the other 9 cases the same result was not obtained, though 2 became sugar free on a dietary regime plus the continued administration of larger doses of NAA. In all patients there was a more or less definite improvement in carbohydrate tolerance, which was shown either by the blood-sugar remaining fairly normal without insulin, or by a substantial reduction in the amount of insulin required. In general similar results were obtained, so it has not seemed necessary to give details of more than 3 cases, especially as these observations can only be considered as preliminary.

CASE 1.—A man, aged 67, suffering from gangrenous ulceration of the big toe, heel, and the lateral side of the left foot. He also complained of excessive thirst, polyuria, tiredness and loss of weight. He had not previously received any treatment. There was heavy glycosuria but no ketosis. He was placed on a diet containing carbohydrate 156 g., protein 60·5 g. and fat 71 g. daily. His blood-sugar percentages at 1, 2 and 3 hours after the main meals were as [illegible] 231, 263, 287, 310, 340, 305, 287 mg. per [illegible] at 2 and 3 hr. after supper omitted for technical reasons). After a 3-day period of observation he received 1 tablet containing 500 mg. NAA 4 times daily. His diet was not altered. He became sugar free in two days. His blood-sugar percentages on the third day were: 100, 109, 141, 137, 127, 118, 104, 118, 110 mg. per 100 c.cm. NAA was successively reduced after the first week to three doses of 100 mg. daily until on the 15th day it was entirely omitted. In spite of this the blood-sugar remained normal. His diet was then increased to C. 186, P. 67·5 and F. 84 g. On re-examination 3 months later he was sugar free and free from symptoms. A sugar-tolerance test gave the following percentages of blood-sugar, immediately after the administration of 50 g. of glucose and at half-hourly intervals afterwards: 127, 141, 191, 221, 210, 227, 206, 177 mg. per 100 c.cm. This patient responded to therapy also by the healing of the gangrenous lesions and the disappearance of symptoms.

CASE 2.—This was one of a group of 4 patients, of whom 2 became sugar free and the other 2 continued to pass traces of sugar in the urine. Their progress was slow, and at first unsatisfactory, until a high carbohydrate, low calorie, low fat diet was given. The skeleton diet was successively increased after the patients became sugar free, but large doses of NAA are still necessary to keep them balanced.

A civil servant, aged 65, was healthy until four years ago, when he was suddenly seized with extremely severe pain in the chest. Electrocardiographic tracings confirmed the diagnosis of coronary thrombosis. X-ray and physical examination showed well-marked cardiac enlargement and some dilatation of the aorta. He made a steady recovery, but became worse in the last 6 months. His nights were disturbed, because he had to pass large quantities of urine. He complained of inability to concentrate, general weakness, loss of weight and thirst. There was heavy glycosuria but no ketosis. His fasting blood-sugar was 234 mg. per 100 c.cm. He had not received dietetic or insulin treatment before admission. The blood-sugar percentages on a diet of C. 156, P. 60·5, F. 71 g. were: 210, 264, 301, 324, 287, 255, 264, 236 mg. per 100 c.cm. After 2 days' observation, NAA 500 mg. was given three times daily. On the third day his blood-sugar percentages were 156, 202, 196, 151, 187, 177, 210, 187, 166 mg. per 100 c.cm. He was then put on a diet of C. 85, P. 45, F. 40 g.; calorie value 880. He became sugar free on the third day. The diet was successively increased, first in the afternoon and evening, and later also in the morning, because there seemed to be a lack period, until a daily total of C. 156, P. 50, F. 40 g. was reached. The dose of NAA had to be raised to 2500 mg. daily, and this dosage was kept constant for 7 days, when a further improvement in tolerance took place. His blood-sugar became gradually normal, and the dose of NAA could be reduced to 1500 mg. daily. At this stage stabilisation seemed to set in, and additions in protein and fat could be made which allowed the patient to obtain the caloric intake he needed. When re-examined 2 months later on a diet of C. 156, P. 80, F. 70 g., he was sugar free, and the blood-sugar was within normal limits. He feels extremely well, and has not experienced any further anginal pain. He has, however, to take three 500 mg. tablets of NAA daily.

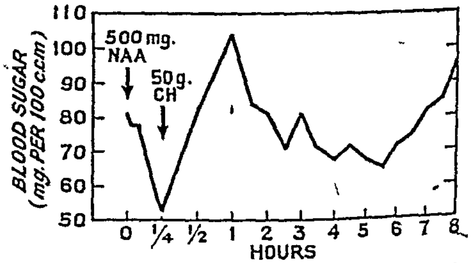

Fig. 5—Blood-sugar after administration of enteric coated tablet containing 500 mg. NAA.

CASE 3.—A man, aged 61, with 6 years history of diabetes. His insulin requirement was between 40 and 45 units daily. At the time of these observations he was on a diet of C. 220, P. 120, F. 110 g, and though he felt well and free from symptoms he was hyperglycaemic throughout the day and passed large amounts of sugar in the urine. As his work was of importance he did not remain under clinical observation for more than 7 days. During this time his diet was not changed, but insulin was suspended and three doses of NAA 500 mg. given daily. His blood-sugar percentages on the third day were: 127, 156, 171, 201, 191, 206, 196, 166, 196, 186, 206 mg. per 100 c cm. On the fourth day 10 units of PZ insulin and 5 units unmodified insulin were given in the morning, in conjunction with three doses of 500 mg. NAA during the day. He became sugar-free on the sixth day, when blood-sugar percentages were: 127, 127, 151, 141, 137, 156, 141, 127 mg. Re-examination 2¼ months later showed traces of sugar after breakfast. He was sugar free during the remaining part of the day. There is thus a saving of 30 units of insulin, apart from the clinical improvement.

DISCUSSION

[illegible] appear to conform with the [illegible] n of insulin is dependent on [illegible]. This may be impaired under [illegible] g varying degrees of insulin inactivity or insulin resistance. Himsworth (1933, 1935), who with Scott (1938a, b) investigated the varying response to insulin by an elaborate series of studies, came to the conclusion that some factor exists to activate insulin, though later they favoured the presence of an inhibitor. The principle responsible for the activating effect is believed to be produced in the liver. The inhibiting agent is attributed to a secretion of the anterior pituitary gland. Evidence that either principle, or both together, accounts for the normal action of insulin has not yet been found. The present investigation suggests that nicotinic acid is in some way connected with the factor referred to by Himsworth as responsible for the activation of insulin.

The most significant of the findings seems to be the well-marked depression of the blood-sugar in normal subjects by nicotinic acid. At present there is no convincing [illegible] increase[illegible] injected [illegible] be increased [illegible] nce conforms [illegible] e of nicotinic acid in the treatment of diabetes. The exact pharmacological mechanism is not clear, though Vilter and Spies (1939) suggested that nicotinic acid is probably not used by the organism as such, but as a component of some enzyme system. The essential co-enzymes which are of immediate interest are 1 and 2, of which nicotinic acid is a component. Its administration may therefore cause greater activity of certain enzyme systems, and some such chemical process seems likely to account for the rapid and powerful reaction of the blood-sugar to nicotinic acid.

SUMMARY

Observations have been made on the action of nicotinic acid on carbohydrate metabolism in 15 non-diabetic subjects and 12 diabetics.

The blood-sugar depression curve, and the effect of nicotinic [illegible] difference in glucose and [illegible] jected insulin suggest that [illegible] o the action of insulin.

In diabetics the administration of nicotinic acid amide improved the carbohydrate tolerance in all cases.

I am grateful to Messrs. Ward, Blenkinsop and Co. of Liverpool for supplies of nicotinic acid and nicotinic acid amide.

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TREATMENT OF BURNS WITH TRIPLE-DYE-SOAP MIXTURE

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IN this war mechanisation has greatly increased the incidence of burns; it has even been said that this is a "burn war." The urgent need for an ideal coagulation method of treatment needs no emphasis. Though a great advance, tannic acid is not the ideal remedy. It is the purpose of this paper to discuss the problems of coagulation therapy and to introduce a triple-dye-soap mixture for this purpose.

A search is being made for a pliable bacteriostatic coagulum. The varying methods advocated in the treatment of burns since Davidson's discovery in 1925 all aim at eliminating infection and fluid loss and minimising tissue damage. If one could find a bacteriostatic and non-toxic coagulum which is also supple, the main objections inherent in tannic-acid treatment would be overcome.

The ideal coagulum must be durable non-contractile; pliable indefinitely, even if thickly applied; non toxic; non-irritant; resistant to trauma; bactericidal: and painless. In addition, the materials should be cheap and easily obtained.

Triple-dye treatment fulfils these criteria to some extent, but the coagulum formed by it, especially if thickly applied, soon becomes stiff. Tannic acid does not prevent the onset of sepsis, and when sepsis has developed, the toughness of the coagulum increases the amount of tissue damage, through lack of drainage and increased tension. This coagulum is very stiff, and is said to contract so that it acts as a tight splint; in addition, there is strong evidence that liver damage may result from its excessive use.

"Flavine bags," like those used by Bunyan, are suitable for fingers and hands, but the difficulty of using them for more extensive areas in the field renders them unpractical. Saline baths have their adherents, but, without staff trained in aseptic ritual and buildings which can be treated with aerosols, this method is dangerous owing to recurrent infection. Treatment with sulphanilamide and paraffined gauze after primary skin cleansing in no way prevents staphylococcal infection, and evidence in this series of cases suggests that it does [illegible] difficult to obtain and the tan is rather too tough and adherent.

EXPERIMENTS

The following formulæ have been tried:—

Gum acacia with triple dye makes a paste which remains soft, but the main objection to it is that it is not durable.

Egg albumin and triple dye make a thin, firm and pliable coagulum which appears to be satisfactory. The main drawback is the difficulty of obtaining sufficient egg albumin [illegible] able coagulum but [illegible] hard [illegible] which shrinks and [illegible].

Blood and soap make a soft durable pliable coagulum below which epithelialisation proceeds rapidly. The use of blood was suggested by the fact that a clean burn, unlike a clean wound, is not sealed from the air by fibrin. This method has been used in only a few cases but it appears to be satisfactory even in the presence of sepsis. Blood, 10 c.cm, with soft soap solution, 10 c cm, is sufficient to coagulate a burn involving the whole of one lower limb.

Triple dye and soft soap give a soft firm coagulum which does not contract and which retains its pliability for weeks. It satisfies all the criteria already discussed. The most satisfactory soap is sapo mollis *BP* (potassium oleate), which is mixed with three parts of water and sterilised by boiling. Equal parts of this soap solution and triple dye (gentian [illegible]) are then mixed [illegible].

[illegible] Lux, shaving soap, and hard soap (sodium oleate) have been tried but their coagulum soon becomes hard.

TRIPLE-DYE SOFT-SOAP MIXTURE

Advantages.—The use of soft soap was prompted by the facts that it is hygroscopic and remains moist and soft; easily obtained and cheap; and a good cleanser.

The coagulum formed by the triple-dye soft-soap mixture is durable and remains pliable for at least ten weeks. It is elastic and does not prevent active movements of the fingers or other joints. No anæsthetic other than morphine is required for its application, and painful dressings are avoided. The mixture, unlike tannic acid, appears clinically to have a definite inhibitory action on staphylococcal infection, while excessive granulation-tissue formation, which may delay healing in third-degree burns, is prevented. This action may be due to lack of tension and pressure or to the absence of the excessive moisture or heat which develop with plaster-of-paris or heavy oily dressings. Further, the elimination of repeated dressings minimises infection. It is noteworthy that the most satisfactory tans, like those of triple-dye-soap mixture and silver nitrate, tend to prevent over-granulation.

Method of application.—The triple-dye-soap mixture is applied to *recent* burns with strict aseptic ritual in the theatre after the hypodermic injection of gr. ¼ of morphine. The burns are not irrigated and the mixture is sprayed on the affected area with a de Vilbis spray. It is important to cover an area extending at least an inch from the obvious periphery of the burn with the triple-dye-soap mixture. The spraying is almost painless and ensures penetration of the mixture into the important angle between the already dead skin and the severely injured but possibly viable skin at the periphery of broken blisters. Blisters not already broken are left intact and the triple-dye-soap mixture is injected into them with a hypodermic syringe and fine needle. The coagulated area is then dried by exposure to air or with a hair dryer. The patient is encouraged to move the burnt parts about, and if any cracks appear in the coagulum they are sprayed again immediately.

In extensive burns it is impossible to prevent pressure which causes breaks in the coagulum. Such cases can be treated with an application made of equal parts of sterile soft soap and triple dye left on for ten days. This application remains sterile if exposed to the air and can be removed easily from the skin by water.

Burnt limbs are suspended at once after treatment, and this is accomplished in the case of the upper limbs by allowing the hands to rest in loops of bandage fastened to the ceiling, unless the palms are also burnt. Even if the palms are burned, their thick epithelium usually remains intact, and after treatment by the triple-dye-soap mixture they may be allowed to rest on a sterile towel. If the patient then constantly moves the hands the pressure on the palms is slight. It is rare for the soles of the feet to be burnt, so that the lower limbs can almost always be suspended by means of a bandage or sock fixed to the plantar surface by Sinclair's glue and tied to a bed cradle. The patient moves the affected parts as far as he can without severe pain. In this way fingers and wrists, elbows and knees do not become stiff.

The face is sprayed in the same way, the palpebral fissures being protected by saline swabs.

When the coagulum is complete and dry, it is left alone and allowed to fall off. One complete cast of a hand, including the dead fingernails, was obtained from a patient and is as flexible now as when it was applied more than ten weeks ago. This cast also shows the small depressed areas which were evidently third-degree burns.

Septic burns are treated similarly, except that they are irrigated (not swabbed) with physiological saline before being sprayed. Cultures of the infecting organisms are made. Burns already coagulated inevitably become infected if the dye is not applied at least an inch peripheral to the damaged area, if cracks are allowed to appear at the flexures, or if the coagulated areas are subjected to pressure. Should pus form under it the coagulum is not removed, but the pus is allowed to ooze out and the opening is sprayed with the mixture. This minimises the risk of superadded bacterial infection.

When burnt and infected lower limbs have been [illegible] in plaster-of-paris for more than a few days their muscles become toneless and wasted and the knee-joint becomes stiff. In these circumstances suspension of the limb by means of a sock or bandage glued to the sole should be employed only with great caution, because hyperextension of the knee and œdem [illegible] follow, owing to the inability of the [illegible] the muscles of the limb. The limb should have a dressing of triple-dye soft-soap (as in the case of parts subjected to pressure) which may be left on for ten days. It should be supported at night on a back-splint.

General treatment.—Certain rules must be observed if the treatment is to be successful. Burned patients must be segregated as far as possible, and an interested and diligent staff must give them constant care, to see that suspension is maintained, that the burns are kept well dyed, and that the patient is encouraged to move the parts. The well-known rules for preventing cross-infection must be rigidly obeyed. All lower limbs must be protected by bed cradles. Morphine should not be withheld and phenobarbitone is helpful to allay anxiety. Fluid-balance charts are kept in all cases and an adequate salt intake is ensured by giving at least 6 pints of a mixture of common salt (¼ teaspoonful), bicarbonate of soda (2 teaspoonsful), glucose (2 tablespoonsful), and the juice of 2 oranges in a pint of water in 24 hours. Hypoproteinæmia and avitaminosis are counteracted by adequate diet, and in the former state plasma is given if required. Secondary anæmia is counteracted by ferrous iron; and alcohol is given in the form of beer. Cases with extensive burns feel the cold and it is well to keep them in a small room which can be artificially warmed. Pneumonia jackets should not be used. Finger movements are maintained in the initial stages by allowing the patients to squeeze pieces of 'Sorbo' rubber which can be boiled, and later by occupational therapy such as embroidery, tatting or French knitting. Massage is not required.

Material treated.—Of 206 cases of burns dealt with the last 106 were treated by the triple-dye-soap method. In these 106 cases there were no first-degree burns; the great majority were of the second degree, and only a few had small areas of third-degree burning. The series included 85 burnt hands, 40 burnt faces and 23 extensive burns (involving three limbs or more, or two limbs with face and neck or more).

Five different treatments had been used before admission. The favourite treatment was saline cleansing followed by sulphanilamide powder and paraffined gauze. Of the 106 cases, 15 were clean on admission; 91 were septic and 41 of these were febrile (temperature over 100° F. on admission). Of the 80 sulphanilamide-treated cases, 68 were septic and 26 of these were febrile.

The commonest infecting organisms were *Staphylococcus albus*, *Streptococcus hæmolyticus*, *B. proteus*, *B. coli*, diphtheroids, *Staph. aureus* and *Staph. hæmolyticus*. The average interval before they were treated here was 7 days (shortest interval 1 day, longest 33 days).

Results.—There were no deaths in the series. No case required skin-grafting. All regained full movements of digits, limbs and eyelids with minimal scarring and no contractures. In no case was it necessary here to use plasma-transfusion. Four of the pyrexial cases with extensive burns had enuresis and mental upset but no fæcal incontinence. Maggot infection did not occur in any of the cases, whereas it was common in other septic cases and was seen in 3 cases of septic burns treated by other methods. Agranulocytosis developed in one case; 2 cases were infected with the Klebs-Loffler bacillus in their burns from an adjacent patient who contracted laryngeal diphtheria. Both these cases took a very long time to heal.

DURATION OF HEALING OF 91 SEPTIC BURNS TREATED WITH TRIPLE-DYE-SOAP MIXTURE

Parts burnt	Days for healing	Av. days before treatment
Hands	22	4
Face	17	4
Extensive burns ..	35½	7

The average duration of healing of septic cases is given in the table. Clean cases are not included because of their small numbers. The duration of treatment was not thought to be excessive.

SUMMARY

A pliable non-irritant antiseptic coagulum is needed for the treatment of burns in the field.

Experiments have been carried out with gum acacia and triple dye, egg albumin and triple dye, collodion and triple dye, soft soap and egg albumin, blood and soap, and triple dye and soft soap. Of these only the last three were satisfactory; but owing to the difficulty of obtaining egg albumin, its use is not at present practicable.

A blood and soft-soap mixture makes a soft, durable, pliable coagulum under which healing seems to be rapid. So far, however, only 5 cases have been treated with this.

A triple-dye-soap mixture produces a soft, fine, supple coagulum which does not contract and which in my opinion reduces sepsis. A group of 106 cases, mostly second-degree burns, involving the face, hands and other parts of the body, have been treated with this mixture; some were very extensive; 91 of the cases were septic on admission and 11 of these were febrile. There were no deaths, no skin-grafts were necessary, and all healed in a satisfactory period with a minimum of scarring and no contracture.

My thanks are due to Colonel L. A. J. Graham, OC a General Hospital, for permission to do this work, to Lieut.-Colonel C. Naunton Morgan for his advice and criticism, and to Major R. S. Illingworth for reviewing this paper.

ACHALASIA OF THE CARDIA

TREATMENT WITH NITRITES

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RELAXATION of the cardiac sphincter, when a wave of peristalsis reaches it, is thought to be an active process dependent on the integrity of Auerbach's plexus which lies between the circular and longitudinal muscular coats. Hurst's view is that achalasia of the cardia is the result of destructive changes as a sequel to inflammation spreading from the mucous membrane from a primary œsophagitis, or resulting from a blood-borne infection. The two chief arguments to support it are these: (1) That a bougie is not gripped by the cardia as one would expect from a spasmodic sphincter; it may be argued, however, that the cardiac sphincter is anatomically and physiologically weak compared with the anal or pyloric sphincters and a spasm sufficient to obstruct a food-bolus would not exert a noticeable grip on a bougie. (2) That Rake found, in fact, the lesions of Auerbach's plexus anticipated by Hurst; but since œsophagitis invariably arises in achalasia such lesions would be expected, especially in the lower reaches of the gullet.

A mere failure to relax would not account for the prompt re-closure of the cardia in achalasia when barium emulsion in excess of a 6–7 in. column has forced its way into a stomach by virtue of its weight. If, for instance, the emulsion be swallowed until the column is say 8 in. high, barium will run through the cardia to reduce it to about 6 in. in height, the cardia promptly closing at this point. This must be an active and forceful process which seems to merit the name of "spasm."

The main purpose of this article is to draw attention to a form of treatment which seems to be promising and less unpleasant than the use of mercury bougies.

METHODS OF TREATMENT

Belladonna alkaloids.—Spasm of various parts of the alimentary tract, when dependent on the integrity of the nerve-supply, almost always yields to full doses of belladonna alkaloids. The action is a peripheral one and is exerted with the minimal amount of cerebral effect by hyoscyamine.

Experiments were carried out with the sulphate in doses of gr. 1/80 thrice daily. This dose produces in two or three days toxic symptoms in the form of dilated pupils, dry mouth, tachycardia and nausea. It delays the emptying rate of the stomach, lowers its tone and abolishes pyloric spasm associated with duodenal ulceration, or the gastric spasm of gastric ulcer. It was found to have no effect on achalasia.

Eumydrine.—The next drug tried was methyl atropine nitrate ('Eumydrine') in doses of 6 mg. four-hourly in one case and 8 mg. four-hourly in another. After three days on this high dosage the achalasia was unchanged.

Pharmacological evidence then supports Hurst's view that the disease does not depend on spasm controlled by nervous impulses.

Nitrites.—It seemed reasonable to expect the nitrites, whose relaxing effect is exerted directly on plain muscle, to be of benefit, provided that no secondary cicatricial changes had taken place as the result of œsophagitis. In other words, patients whose symptoms did not extend over a year should be suitable subjects. Two male and two female outpatients conforming to this requirement were available. In each the symptoms and radiological appearances were quite typical of achalasia. While the œsophagus was holding from 5 to 7 in. of barium they were observed under the screen and given 3 minims of amyl nitrite to inhale.

The first change observed was increased rate of the heart-beat. This was immediately followed by the whole of the barium falling through into the stomach. The patient knew at once when this happened. The effect of the nitrite was, however, transient and at the end of five minutes the cardia had closed. In spite of this the patients were free from symptoms for a whole meal of mixed foods if nitrite were inhaled at the beginning. Within three to five weeks they could enjoy food without any sensation of obstruction if they inhaled amyl nitrite once a day, or, in one case, once in two days. The last instance was the subject of my first experiment and has consequently been under observation while taking amyl nitrite for a longer period than the others—namely, nine months. At the end of this period, for the first time in a series of radiological investigations, there appears a demonstrable lessening of the obstructive force up to 36 hours after the last inhalation. Hitherto in spite of much relief from symptoms his barium retention reached a height of 7 in. Now, although a fluid level (saliva and mucus) can be seen reaching to the upper border of the sternum, the heavier barium sediments through this and passes into the stomach 24 hours after his last inhalation.

Glyceryl trinitrate tablets were used next: gr. 1/60 sublingually before all meals. They produced severe headache and no alleviation of symptoms. After a week of this treatment two of the patients were X rayed two hours after taking the last tablets, and no improvement in the rate of passage of the barium was seen. An immediate effect is produced and is referred to subsequently.

Mc [illegible] he mercury-filled [illegible] for hours or days [illegible] comparison would [illegible] investigate this point. Five persons who had been inpatients at Guy's Hospital, and whose symptoms of achalasia extended over periods from two to four years, were recalled for examination. They had all been instructed in the use of the tube and had passed it at first before all meals, later less often as they felt they were improving. Three had now reached the stage of not requiring the tube oftener than once a week. Yet those three showed no radiological improvement in their condition, the barium column being about 7 in. high. A fourth patient had been passing the tube daily and had done so on the day of the fresh X ray. The œsophagus was seen to be dilated but there was no hold-up of barium. The fifth patient had passed the tube every night until a month before the examination, when all symptoms subsided. Her œsophagus was also dilated but showed no delay in the passage of barium.

[illegible]

response compared with that described in the recent cases. In one, however, it produced prompt and complete emptying. Later each of the three was given gr. 1/60 of glyceryl trinitrate sublingually. Increased flow of barium resulted in about five minutes and was maintained for nearly half an hour. The barium level

Principle of test.—The test is a spot test and makes use of the reaction between bromide and auric chloride.[2] A mixture of trichloracetic acid and auric chloride is added to a drop of serum spread out on a white porcelain surface. The protein is thereby precipitated, and the auric chloride reacts with any bromide present to give a brown product which is adsorbed on the precipitated protein. The coloured substance thus becomes concentrated in a ring instead of being diffused through the drop. It shows up sharply against the surrounding fluid since the pigments of the serum are scarcely visible in so thin a layer.

For urine, the same test may be used. In order to obtain a ring of precipitated protein, egg-white or bromide-free serum is added to the urine before the test is made. The brown ring is then similar to that obtained with serum.

Reagents.—(*a*) 20% trichloracetic acid. (*b*) 0·25% auric chloride (brown chloride of gold). The reagent is made by mixing equal parts of (*a*) and (*b*) and keeps indefinitely in a brown bottle.

The test on serum.—One drop of serum is placed on a white porcelain surface and spread over an area the size of a sixpence. One drop of the reagent is then placed in the centre of the serum. A positive result is indicated by the appearance of a circular ring of precipitated protein which appears almost immediately and is coloured yellow to red-brown according to the concentration of bromide present—25 mg. bromide per 100 ml. gives a yellow colour; 50 mg. per 100 ml. and over, a red-brown.

The test on urine.—Two drops of urine are placed on a white porcelain surface and spread out as with serum. One drop of a 10% solution of egg-white in water is added. Alternatively, one drop of serum, which is free from bromide and only lightly pigmented, may be used. The urine and protein are mixed with a small glass rod. One drop of the reagent is placed in the centre. The result is interpreted as with serum.

The test should be performed in daylight if the concentration of bromide is low. Specimens containing high concentrations of bromide, such as are found in cases of bromism (sometimes above 300 mg. per 100 ml. serum) give an unmistakable deep red-brown colour even in artificial light. Hæmolysed blood should not be used. Iodides interfere with the test[1 3] and give a green-brown colour. Their presence can be detected by the further addition of one drop of starch solution. The porcelain surface must be washed thoroughly after each test.

The test is so simple that the presence of excessive bromide in serum or urine can be detected in a few seconds.

At this hospital the urine of each patient is tested for bromide on admission, by means of the spot test. If the spot test on the urine is negative, this finding is checked by a spot test on the patient's serum, because the urine test might be negative or doubtful in a case of bromism through excessive dilution of the urine. This is, however, seldom the case. If the spot test is found to be positive in either serum or urine, then the bromide is estimated in the serum by Wuth's technique.[3] This routine results in a considerable saving of time and material.

I wish to thank Dr. R. Ström-Olsen, physician superintendent of Runwell Hospital, for permission to publish this paper, and Mr. G. D. Greville, PH D, for his advice and criticism.

Reviews of Books

Food Poisoning

G. M DACK, PH D, MD, associate professor of bacteriology in the University of Chicago. (Cambridge University Press. Pp. 138. 12*s*.)

THIS book contains good accounts of most aspects of food-poisoning but is unequal. Staphylococcus food-poisoning is of increasing importance, and this is discussed in the most complete and valuable chapter in the book. Professor Dack considers it unlikely that staphylococcal toxins are the only toxins which cause food-poisoning, but he rejects the view that salmonella toxins can be responsible. This does not account for outbreaks of toxin type (especially associated with canned foods) in which no living bacilli can be isolated. The section on botulism covers all aspects of this type of food-poisoning, but the widespread and important salmonella variety is dismissed with a brevity that omits many important factors. The distribution of salmonella strains in the animal kingdom except among rats and mice is barely mentioned, and the importance of the type of salmonella (for example *S. enteritidis* Dublin) in relation to the source of infection is not discussed. Salmonella poisoning is described as an infection but the absence of blood infections is not given its significance. The statement that it is necessary to demonstrate living salmonella in order to substantiate a diagnosis of that type of food-poisoning disregards the diagnostic significance of high agglutination titres. Bacillary dysentery is mentioned only as an infection to be differentiated from food-poisoning, and in this section attention might well be drawn to the close resemblance to food-poisoning of some outbreaks due to the Sonne type. Other sections deal with chemical food-poisoning and poisoning from plants and animals. Though the book is not a complete guide to food-poisoning, it contains much information only accessible hitherto in isolated articles.

Synopsis of Diseases of the Skin

RICHARD L. SUTTON, MD, emeritus professor; RICHARD L. SUTTON, jun., MD, assistant professor of dermatology, University of Kansas. (Kimpton. Pp. 481. 28*s*.)

THE two Kansas professors cover the whole field of dermatology and present a mass of information clearly concisely. The commoner and more important diseases are dealt with quite fully and there are useful data about the others. References are plentiful and the sections on treatment are to the point. The many photographs and microphotographs have been well chosen. Though rather expensive for its size, this work should prove useful to students or busy practitioners.

Treasury of Human Inheritance

Vol. IV, Part 4. On Pseudohypertrophic and Allied Types of Progressive Muscular Dystrophy. JULIA BELL, MA, FRCP. (Cambridge University Press. Pp. 59. 12*s*. 6*d*.)

THIS series was inaugurated on a spacious plan, with large pages, well-arranged pedigree charts, full bibliographies and copious extracts from the original descriptions. The first volume started with comparatively brief studies by various authors, covering such diverse topics as diabetes insipidus, polydactylism, brachydactylism, tuberculosis, deaf-mutism and legal ability (parts 1 and 2) and angioneurotic œdema, hermaphroditism, deaf-mutism, insanity and commercial ability (part 3). But even before the first volume was complete each part had become a massive monograph dealing with a single subject. And subsequent volumes, with the exception of one contribution, have been entirely the work of that indefatigable student of human genetics, Miss Julia Bell. This fourth part of a volume devoted to nervous diseases and muscular dystrophies shows among other things that transmission in different families may be dominant, recessive or sex-linked, and that there is a real though imperfect association between mode of inheritance and clinical type. In age at onset and interval before death there are striking differences. Affected subjects from sex-linked families are on an average aged 5 at the onset, and die on an average at 17; dominant cases begin at about 19 and die at about 50; recessive cases are intermediate in both respects. Interpreting an extensive, carefully compiled but anomalous pedigree derived from Wagner, Miss Bell suggests sex-linked inheritance as the explanation; but surely either dominant transmission with the skipping of generations or successive transmission in a highly inbred stock would cover the facts more plausibly? Interesting as her commentary is, the chief value of the book lies in the raw data which it assembles, and which, as Karl Pearson planned, will provide a rich store-house of material for many years to come. The format is as good as ever and the price modest for war-time.

THE LANCET

LONDON: SATURDAY, SEPTEMBER 18, 1943

FOR THE GREATER WAR

SINCE September, 1939, this country has made two major discoveries. In four years of war the British have learnt that they are still capable of resolute action; and they have also learnt that a nation's power to act is limited not by money but by the materials, labour and brains at its disposal. They now know that postwar reconstruction should be regarded purely as a problem of priorities—what shall we do first? We can have ships, railways, libraries, factories, canals, clothes, houses, food, schools, hospitals, shops, cinemas, research laboratories, motor-cars, health centres, aircraft, or leisure; but we cannot have them all at once; we must choose which we want to begin with. The fact that resources will be straitened makes it all the more important to do the most useful things first and to do them, moreover, in accordance with a declared plan. Russia has shown that men and women will gladly tolerate even extreme poverty if they have hope—if they see around them evidence of progress and construction. When the present war is over we must try to preserve and deepen our unity by declaring a greater war—a war on ignorance, squalor, disease and want, and on their allies.

In such a war the medical profession should be a leader. Its promises should inspire the people, its knowledge direct the sequence of their assaults. But something is wanting in this candidate for leadership: he may know, but he seldom speaks. For example, in our very midst lies an established fortress of ignorance, squalor, disease and want. But do we hear doctors, in season and out, declaiming against the slums and their supporters? Is the doctor associated in everybody's mind with untiring insistence on better housing in town and country? Is he visibly shocked at what Sir FARQUHAR BUZZARD[1] rightly calls "the incredibly late and slow action on the part of the State and of Local Government in ameliorating the conditions under which the poor live and work"? The general practitioner, writes Prof. J. M. MACKINTOSH[2] has "unrivalled opportunities of studying at first hand the relation of housing to health. . . . Why is he silent? Why does he not agitate about some of the housing conditions he sees every day?" And here are some of the reasons Professor MACKINTOSH offers:

> (1) The practitioner is
> rival professional men in a
> In the days when many g
> part-time medical officers of health, they found that if they became active social reformers they lost their public appointments. Nowadays they feel that housing and community health are not their job. . . .
>
> (2) He is an individual, serving for his livelihood the landlords as well as the tenants. He may take up the cause of the one against the other, but commonly at the risk of losing the lucrative part of his practice. And why should he, in a world of financial competition, be more altruistic than his neighbours? He is in a difficult position, probably with a wife to be maintained and children to be educated and cared for; very likely, if he is young, with a load of debt hung about his neck, because he had to borrow a considerable sum to buy his practice. Do not blame him: it is the system and not the practitioner that is at fault.
>
> (3) He is a sickness expert and not an adviser on health. Under the existing system of panel practice he is called in only when a member of a household is ill. The state does not pay him to take an interest in health, or even in social factors that influence disease.

"It is the system and not the practitioner that is at fault." Next week the largest parliament of the profession, the Representative Body of the British Medical Association, meet to consider the system and its possible modification. May we not hope that they will show themselves conscious of the need for medicine to throw its full weight into the struggle against disease—to mobilise for the war that lies ahead? The omens are inauspicious. Dr. G. C. ANDERSON,[3] with other experienced observers, has "seen a tendency during the past few weeks for opinion in the profession to swing right back from the progressive outlook of the Medical Planning Commission. . . ." We know all too well that such gatherings normally give more thought to rights than to duties: they applaud the speaker who looks back rather than the one who looks forward. Under the present system they are necessarily formed mostly of men who are rarely able to relax from the worry of earning a living in small fragments—men whose policy tends to be "the status quo plus x." How many doctors have soberly considered what they might gain, and what medicine might gain, from a new freedom—freedom from fee-getting—which might enable them to do their fundamental work more effectively both as individuals and as a profession? "Salary payment," says Prof. J. P. PETERS,[4] of Yale, "might allow more of them to join the ranks of those who are improving the healing art." Though it is premature to suggest that all participants in a national medical service should be paid by salary, the time has certainly come for large experiments in remuneration as in much else.

We all know well that a great deal more could be done to make people healthier, saner and happier; and we ought not to be content until we are in a position to demand and perform the resolute actions required in peace as well as in war. Then as now, in medicine as elsewhere, it will be essential to make the best use of materials, labour and brains. Whatever our present representatives may think, we are not going back to 1939.

CONTROL OF INSTITUTIONAL DYSENTERY

THE incidence of dysentery in a community, they say, is a measure of the standard of sanitation and personal hygiene in that community. This aphorism finds point in the frequency of dysentery outbreaks in institutions for mental defectives, the insane, and the old and infirm, where the inmates cannot attain the degree of personal cleanliness expected of the ordinary citizen. But dysentery is also apt to spread in other closed communities where for one reason or another a high standard of hygiene cannot be maintained; current examples are the troopship and the day or residential nursery. Dysentery is an endemic infection in most mental hospitals, waxing and waning as local conditions prove favourable or otherwise for its spread; a sudden influx of new patients, an infected food-handler, inadequacies in the diet leading to lowered resistance, or the introduction of a new strain of the dysentery bacillus are among the probable causes of an epidemic flare-up. This "asylum dysentery" has so far defied a variety of measures aimed at its eradication; among these are immediate isolation of the clinical cases together with improved hygienic conditions such as was initiated at Wakefield Mental Hospital, or the use of polyvalent vaccines as practised at Caterham.[1] The difficulty in the past has been the bacteriological detection of the carrier, who may be a case with recurrent diarrhœa (in other words, chronic dysentery), a less persistent convalescent case, or a symptomless and usually temporary contact carrier. The new desoxycholate-citrate agar has solved this problem of detection. Provided laboratory facilities are available, a systematic search can now be made for the dysentery carrier, who when found can be given a course of sulphaguanidine which will offer him a reasonable prospect of cure, particularly if, as is usual in mental hospitals, the infecting organism belongs to the Flexner group. In addition, however, steps must be taken to prevent the introduction of dysentery from outside. All new patients should have fæcal examinations on admission, particular attention being given to those with a history of recurrent diarrhœa. A more difficult problem is to prevent the infection being introduced by staff (nurses, ward maids, kitchen staff) who live outside the institution. They should be specially warned by talks and notices that they must report an attack of diarrhœa, however trivial, and must maintain a high standard of personal hygiene.

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[1] *Practitioner*, September, 1943 (p. 129). This issue contains a valuable symposium on Social and Preventive Medicine, including papers by Sir Farquhar Buzzard, Sir Arthur MacNalty, Professor Mackintosh, Prof. J. A. Charles and Miss Margaret Roxburgh.

[2] *Ibid*, p. 139.

[3] *Brit. med. J.* Sept. 4, 1943 (suppl. p. 29).

[4] *Yale J. Biol. Med.* 1942, 14, 279.

When an outbreak of dysentery starts there is a choice of two plans of action. The clinical cases may be isolated, the affected ward put in quarantine, and a bacteriological search made for carriers among contact patients and staff. A contact carrier-rate of 10–30% is not uncommon in ward or institutional outbreaks,[2] and the removal of these carriers puts a heavy strain on the available isolation accommodation. An alternative measure is to give everyone associated with the outbreak a prophylactic or therapeutic course of sulphaguanidine according as he is a contact or clinical case. This method was adopted by SCOTT[3] in an outbreak of Sonne dysentery in a home for mentally defective children. While the epidemic was still spreading with 20 reported cases, 31 uninfected children and all the attendant staff, making about 50 in all, were given a prophylactic course of 0·5 g. sulphaguanidine three times a day. Only one fresh case developed (within an hour of his first dose) after the course was begun, and this sudden cessation of spread, together with the rapid improvement of the clinical cases also under treatment, quickly eased the nursing problem. The prophylactic course was stopped 4 days after the last case was clinically well. Stool cultures 10 days and 3 weeks later were all negative, though we are not told whether selective culture media were used. A strict bacteriological control is essential in the procedure. This apparent bacteriological cure by sulphaguanidine of clinical cases and carriers in a Sonne dysentery outbreak is contrary to experience in this country, where convalescent carriers of the Sonne bacillus have often proved resistant to the drug, though better results have been reported in cases treated during the acute diarrhœal stage.[4] Succinyl sulphathiazole may prove the drug of choice in dealing with Sonne dysentery, and should be used in Flexner carriers who do not respond to sulphaguanidine. The prophylactic value of sulphaguanidine is confirmed by LUCCHESI and GILDERSLEEVE[5] in a ward outbreak where 45 patients intimately exposed to infection were given a course of sulphaguanidine and none of them developed dysentery, whereas 4 out of 48 patients who were in less intimate contact became infected.

Chemoprophylaxis must not be regarded as a substitute for a high standard of hygiene, but it is clearly worthy of extended use in localised outbreaks of dysentery. For example, diarrhœa on troopships is difficult to control and bad for morale; a plentiful supply of sulphaguanidine might remove this worry. Dysentery in training camps may also prove troublesome, and a recent American report[6] shows that, using rectal swabs passed through a short rubber catheter,[7] along with selective media and the new intestinal antiseptics, such outbreaks can quickly be brought under control. We need to get away from the older methods of handling dysentery—the bedpan brought to the laboratory, the use of non-selective media and the failure to search for mild atypical cases and convalescent and contact carriers—if we are to cope successfully with this common and crippling infection.

NERVOUS DISORDERS OF SWALLOWING

A THOROUGH understanding of the physiology of deglutition is an essential introduction to the study of its nervous disorders. NEGUS,[8] in a masterly description of the complicated mechanism of swallowing, a subject which his own investigations in man and animals have done much to elucidate, traces the evolutionary changes which have divided swallowing into three stages—buccal, pharyngeal and œsophageal. It is with the second two that nervous disorders are most likely to interfere, food being held up by the sphincter at the top or bottom of the œsophagus. Since the upper dysphagia of anæmic women was first described by D. R. PATERSON in 1906 and further studied by PLUMMER and VINSON between 1914 and 1922 the syndrome has become recognised as quite a common one, though the dysphagia is often so slight in comparison with the other symptoms that it is liable to be overlooked. It is now clear that the syndrome is the direct result of iron deficiency, which causes not only the anæmia but also atrophy of the mucous membrane of the tongue and pharynx, cracks at the angles of a stiff and narrow mouth, loss of teeth, and spoon-shaped brittle nails. The atrophic condition of the pharyngeal mucosa results in a loss of sensibility, so that the afferent side of the reflex on

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1. Paddle, K. C. L. *J. ment. Sci.* 1938, 84, 134.
2. Caldwell, W. H. and Hardwick, G. W. *Edinb. med. J.* 1943, 50, 129.
3. Scott, J. C. *J. Amer. med. Ass.* 1943, 122, 588.
4. Clay, A. C. *Brit. med. J.* July 10, 1943, p. 35.
5. Lucchesi, P. F. and Gildersleeve, N. *J. Pediat.* 1943, 22, 319.
6. Kuhns, D. M. *Sth. med. J.* 1943, 36, 393.
7. Hardy, A. V., Watt, J. and DeCapito, T. M. *Publ. Hlth Rep., Wash.* 1942, 57, 521.
8. Negus, V. E. *J. Laryng.* 1943, 58, 46.

which the second stage of swallowing depends is impaired. The pharyngo-œsophageal sphincter is particularly involved, the normal relaxation which allows the passage of food from the pharynx into the œsophagus failing to take place (achalasia) or being replaced by spasm. The cause of the iron deficiency is a diet containing too little meat and green vegetables, usually accompanied by achlorhydria which interferes with the adequate preparation for absorption in the intestines of such iron as is present in the food; in many cases there is also excessive loss of blood from menorrhagia. Administration of 30 grains of iron and ammonium citrate three times a day is sufficient to overcome the anæmia and often to restore the atrophic epithelial tissues to normal. If treatment is delayed, the atrophic pharyngeal mucosa may contract and aggravate the dysphagia by adding a mechanical to the neuromuscular disorder. In long-standing cases too the atrophied tissues may undergo malignant degeneration.

The second important nervous disorder of swallowing depends on disturbance in the neuromuscular control of the cardiac sphincter. A sphincter is a segment of a muscular tube in which the postural tone of the circular fibres is such that the lumen is completely obliterated and so shuts off the segment above from the segment below. Whereas during activity a muscular tube contracts, generally as a peristaltic wave, its sphincters relax in order to allow the onward passage of its contents. A sphincter has thus a physiological basis, which is not necessarily associated with an anatomical thickening of the circular muscle coat. The obstruction to the passage of food at the cardia, which is felt by the patient and can be seen with the X rays, is not associated with any organic stricture. At one time it was believed to be the result of cardiospasm, but the absence of hypertrophy of the sphincter and of resistance to the passage of a mercury bougie and of grinning when it is with-

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and HURST independently came to the conclusion that the obstruction was the result of absence of the relaxation (achalasia) which normally occurs when each peristaltic wave conveying food through the œsophagus reaches it. The closed sphincter can support a column of fluid about six inches high. Any excess over this forces it open, so that some of the œsophageal contents enter the stomach, but when the pressure falls to its original height the sphincter resumes its normal "postural tone." In 1924 HURST suggested that achalasia might be the result of organic disease of Auerbach's (myenteric) plexus. In the next year this was proved correct by G. W. RAKE, and disappearance of the ganglion cells resulting from inflammation, fibrosis or simple atrophy has been observed in every one of 32 specimens examined by RAKE and other observers since that time. It has been suggested that these changes are secondary to the œsophagitis which results from stagnation in the dilated œsophagus, but this view cannot be correct, for in Rake's first case the obstruction had been overcome by increased activity of the muscular coat of the œsophagus, which was greatly hypertrophied although neither dilatation nor dysphagia had yet developed. Moreover in many cases simple atrophy or fibrosis with no sign of active or past inflammation is found, and any œsophagitis present is confined to the mucous membrane. In a large majority of cases treatment with HURST'S mercury bougie is very satisfactory, especially if the largest size bougie (34 gauge) is used and the accompanying œsophagitis is treated during the first two or three weeks. As a rule the patient can reduce the frequency of the passage of the bougie gradually until finally it is no longer required or is used only at rare intervals if he finds that some slight obstruction is returning.

So successful has the bougie been in relieving cardiac achalasia that little attempt seems to have been made to find a pharmacological substitute. On another page DOUTHWAITE sets out his observations on the effect of certain drugs. Since the posterior ganglionic fibres are degenerated it is natural that he should find drugs such as hyoscyamine and eumydrine which act on them without effect. It is equally natural that nitrites, which act directly on plain muscle, should lead to relaxation of the sphincter. He has observed with X rays the opening of the sphincter produced by nitrites and has found that, short-lived as their action is, it is sometimes a useful alternative or addition to treatment with a mercury bougie.

Annotations

TYPHUS IN SPAIN, 1941–42

THE menace of typhus looms over all the occupied countries of Europe. It is true that the present war has not so far witnessed a major epidemic comparable to those that decimated the armies and civilians of Serbia and Rumania during 1914–18, or to the Russian pandemic of 1918–22, but what information we have indicates that typhus has steadily increased since 1939 throughout those areas where the disease was endemic before the war, and that new foci of infection have been established in many parts of Europe which for generations had been free from the disease. From Spain now comes a reminder of what the near or more distant future may have in store for other countries. In his preface to a lavishly illustrated monograph[1] on laboratory techniques in louse-borne typhus, issued by the Spanish Health Directorate, its head, Prof. J. A. Palanca, tells us that the book deals with a problem that has been lived through and a technique that has been put to practical use. The experience of the Spanish health authorities is an illuminating example of the evolution of typhus epidemics. Before the civil war typhus had practically disappeared from Spain. The civil war that lasted for two and not lead to the expected s only as a result of the sev and long-continued malnutrition after the war that typhus made a definite appearance. The first outbreaks were small, though the exact figures for 1939 and 1940 are not known, but the next year saw violent epidemics raging in many parts of the country and 7000 cases with 1000 deaths were recorded, while a great number were probably not reported. Palanca had always spoken frankly of the sanitary situation and this enabled him in 1941, at the height of the epidemic to conduct

various parts of the country and mentions particularly the widespread use of prussic acid. This was employed not only in labour camps, prisons and asylums for necessitous persons, where large disinfecting chambers were constructed, but even in small-scale delousing operations in private houses. Prof. Clavero del Campo and Dr. Pérez Gallardo, of the Instituto Nacional de Sanidad, who describe the accepted laboratory procedures in this monograph, deal chiefly with the isolation and maintenance of *Rickettsia prowazeki* in experimental animals, in the louse and in the yolk sac of the developing chick; the serological tests for diagnosing typhus fever; and the methods of making typhus vaccines. It is significant that they discuss only the various types of killed typhus vaccines and do not mention the live-virus typhus vaccines, though, according to earlier reports, such vaccines had been employed at the outset of the epidemic. This book and an earlier one by the same authors on the ætiology, clinical aspects and prophylaxis of louse-borne typhus[2] are mainly directed to Spanish medical and sanitary personnel, but the health authorities of other countries might learn much from them.

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[1] Clavero del Campo, G. and Pérez Gallardo, F. Técnicas de laboratorio en el tifus exantemático, Madrid, 1943.

PAROXYSMAL VENTRICULAR TACHYCARDIA

SINCE James Mackenzie first differentiated it from paroxysmal supraventricular tachycardia 35 years ago, information has accumulated about the diagnosis, significance and treatment of paroxysmal ventricular tachycardia. Cooke and White[3] found 24 cases among 51,000 electrocardiograms taken on 25,000 patients between 1914 and 1939—figures which give some idea of the incidence. In this series one or more of the following criteria were demanded: P waves at a slower rate than that of the abnormal QRS waves during a paroxysm of tachycardia; a paroxysm of abnormal ventricular complexes (three or more) occurring during auricular fibrillation; onset of the tachycardia with an abnormal ventricular complex; or close resemblance of the complexes of ventricular premature beats to the complexes seen during paroxysmal tachycardia. Diagnosis cannot be based on the slight irregularity in rate which may occur, for this is clinically imperceptible at the high rates of paroxysmal tachycardia. Nor is the variation in intensity of the first heart sound of much practical value. The jugular pulse may show regularly recurring auricular waves at a rate slower than the pulse-rate which are suggestive; so is a sudden considerable rise and fall in the pulse-rate in a patient with long-standing auricular fibrillation. It is doubtful whether kymography is of much diagnostic value, in spite of Kahlstorf's[1] claim to have demonstrated the auricular rate accurately by this method in a case of paroxysmal auricular tachycardia. The only dependable evidence is the electrocardiogram.

Of the 27 cases collected by Cooke and White, 22 had coronary heart disease, 4 had no other cardiac abnormality, and 1 was thought to have a congenital ventricular septal defect; 17 were men and 10 women, and the maximum age-incidence was in the sixth decade, the oldest patient being 81. The youngest was 18, and his father, a doctor, had observed the attacks since the boy was 5. Beeson and Levine[5] report a case in a child of 13 years. Digitalis had been given to 13 of the 27 patients before the onset of the tachycardia and it was considered to be the chief ætiological factor in 5. There is ample experimental and clinical evidence that digitalis can precipitate an attack of paroxysmal ventricular tachycardia, but, as Scherf and Kisch,[6] have pointed out, the amount of digitalis administered is less important than the state of the heart muscle. Cooke and White go further, suggesting that the state of the conducting rather than the contractile tissues is what matters. The rates of individual paroxysms ranged from 100 to 270 per minute, with an average of 174. The extreme rates of 250 and 270 were found in patients with otherwise normal hearts. The duration of the paroxysms varied from a few seconds to more than four weeks. No definite correlation was found between rate and prognosis; thus of the three patients with rates below 140, two died within a few hours while the third was alive two years later. The prognosis must be based on the whole clinical picture. An attack in a patient with a damaged heart carries a gloomy prognosis, whereas if the heart is otherwise normal the patient may live for years. Quinidine sulphate is the only effective therapy; it can be given either by mouth, intramuscularly or intravenously, but most conveniently by mouth every two hours for five or six doses of gr. 6–9. If this fails quinine dihydrochloride should be given intramuscularly, 5 c.cm. of an aqueous solution containing 0·5 g. every two hours, until normal rhythm is restored or severe cinchonism develops. Alternatively, gr. 50–60 of quinidine sulphate, dissolved in 500 c.cm. of 5% glucose, may be given intravenously at a rate of 100 c.cm. per hour. Boyd and Scherf[7] have found the intravenous injection of 20 c.cm. of a 20% solution of magnesium sulphate of value, though they are hesitant of using it in cases where there is myocardial damage, marked disturbance of intraventricular conduction, or gallop rhythm.

BROMIDE

ONE National Health Insurance prescription in ten is said to contain bromides, yet our knowledge of their toxic effects is far from complete. There seems to be little correlation between blood-bromide figures and dosage on the one hand, and toxic manifestations on the other. As with other drugs, individual susceptibility counts for much, but with bromide there are often obvious predisposing factors. Barbour and others[8] concluded that a blood-bromide of less than 100 mg. per 100 c.cm. can be ignored; a figure between 100 and 200 mg. should be viewed with suspicion, especially in older patients; while anything above 200 mg. is likely to be doing harm. This statement refers to the general picture of bromide poisoning, which is commonly manifested by such mild evils as furred tongue, constipation, headache and perhaps a little dulling and slowing up of mental processes. A well-developed bromide psychosis is much more serious. Angyal,[9] working at the Worcester State Hospital, USA, carefully scrutinised over a five-year period all the admissions in which bromide may have played a part in the production of psychosis. After excluding cases in which other factors were regarded as significant, he found 21 cases that might fairly be labelled bromide psychosis. In these cases the blood-bromide varied from 60 to 400 mg. per 100 c.cm. but Angyal points out that some of these figures are well below the peak because the estimations were made at varying intervals after the cessation of bromide intake. Briefly the clinical picture was of clouding of consciousness, often with delirium, and confusion, disorientation and drowsiness. Hallucination and delusions of a persecutory nature were common, and the predominant emotion was one of fear. Thickened speech and ataxia were the rule; rashes were rare. The diagnosis of bromide poisoning depends on the disappearance of symptoms under treatment with sodium chloride and water. But even so, the ample clinical data set out in Angyal's paper lead one to wonder how far the diagnosis was justified in many of his cases. In no less than 17 other factors seem to have played an important, if not a major, part. These factors were advanced arteriosclerosis, severe alcoholism, gross physical disability, involutional changes and actual organic brain disease. In most of the cases psychotic symptoms appeared before the bromide intake had begun, and in some they persisted or reappeared after treatment. It is noteworthy that the 4 remaining cases, which could be fairly called pure bromide psychosis, were all in comparatively young people, and in every instance the blood-bromide was 200 mg. per 100 c.cm. or over. We must conclude that bromide psychosis is not likely to be clear-cut in its symptomatology, diagnosis or prognosis. The therapeutic test is not enough for diagnosis. In every case there must be a careful study of the previous history as well as of progress after treatment before the part played by bromide can be properly assessed.

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[4] Kahlstorf, A. *Klin. Wschr.* 1936, 15, 1028.

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[8] Barbour, R. F. *Proc. R. Soc. Med.* 1936, 29, 1391; Barbour, R. F., Pilkington, F. and Sargant, W. *Brit. med. J.* 1936, ii, 957.

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BARBITURATES IN BURNS

THE significance of external fluid loss in severe burns has yet to be determined. Examination of a patient several hours after being burnt reveals that a large amount of fluid has escaped into the tissues, while the loss from the surface by evaporation or soakage into dressings represents only a fraction of the total fluid lost from the blood. Nevertheless the amount lost externally may be enough to turn the scale unfavourably for the patient, particularly as this fluid is irretrievable. Though not its original object, the prevention of external fluid loss was long held to be the reason why tannic acid therapy lowered the mortality from serious burns. Now that its unpopularity with plastic surgeons and the growing evidence that it may be toxic have thrown tannic acid into disfavour other ways of controlling exteranl fluid loss are being sought. Beecher and McCarrell[1] claim that pentobarbital sodium ('Nembutal') in sedative doses can reduce the amount of fluid lost in this way from experimental burns in animals. Chickens and rabbits that had been extensively burnt and treated with pentobarbital lost significantly less weight during the first few hours than untreated controls. It was impossible to show this fall in weight in small pigs, but in these animals there was a striking difference in the appearance of the burns. In animals treated with pentobarbital the burnt skin was dry and less œdematous than in the untreated animals, where the surface of the burn was moist. Animals given morphine behaved in the same way as the controls. It is unfortunate that these workers did not estimate the total fluid escaping from the damaged capillaries by measuring the gain in weight of the whole limb. The differences might have been more striking. In discussing the mode of action of the barbiturate they suggest that it may lower the capillary filtration pressure and also produce vasoconstriction. In normal cats pentobarbital will bring about a 10% rise in the plasma volume, whereas this effect is not seen in sympathectomised animals.[2] The observations are worth while pursuing for they seem to provide a link between the fluid-loss and neurogenic theories of the origin of shock. Before barbiturates are used in treating human burns it is essential to find out whether they will prejudice survival or ultimate recovery in severe experimental burns.

DRUG FEVER FROM SULPHADIAZINE

ONE of the commonest toxic reactions to sulphonamides is drug fever, a pyrexia due to the compound itself. It seems usually to be due to some kind of acquired hypersensitivity developed during a previous course of the treatment or during the earlier stages of the same treatment. It is as a rule more a nuisance than a serious misadventure, since it quickly subsides when the drug is stopped; but as a cause of misdiagnosis it may cause confusion and mischief, since it can easily be misinterpreted as evidence of a return of the original infection. Sulphonamide therapy is then continued, often with increased dosage, and agranulocytosis or other major calamities may eventually ensue. A rise of temperature seven days or more after the first dose during a course of sulphonamides is usually due to drug fever and the drug should be stopped unless an extension of the disease can be unequivocally demonstrated. Sulphonamides should rarely be given for more than seven days in succession; if the temperature chart has not shown a response by then, the infection is probably resistant to sulphonamides so that further treatment will be useless or even harmful. Drug-fever has been reported most frequently after sulphathiazole, and Lyons and Balberor[1] found that a second course of this compound caused a febrile reaction in 36% of their cases. Sulphadiazine has been considered innocuous in this respect, but Talbot and Adcock[2] show that this is not always so. They gave a second course of the drug to 37 persons and observed a febrile reaction (temperature over 100° F.) with chills in 6 of them. Maculopapular eruptions appeared in 4 of the patients and brief delirium in four. In one patient at least the sensitivity was strictly specific for sulphadiazine, since he reacted to this compound but not to sulphanilamide or sulphapyridine. The febrile reactions were less severe than those reported after sulphathiazole, but it is clearly advisable to restrict the administration of sulphadiazine (as of all sulphonamides) to those patients for whom it is clearly indicated and to avoid indiscriminate use of any of these compounds. In view of the specificity shown by one case, it might be a good thing, when a patient has previously received sulphonamides, to give a different compound if a second course is necessary.

SHORTENING DISABILITY FROM SPRAIN

TREATMENT of sprain, the textbook says, "consists in putting the part to rest and supporting it firmly by a bandage over cotton-wool so as to limit effusion and bring the segments of the divided structure into close apposition; in the more severe cases a splint should be applied. At the end of a week or ten days the splint may be dispensed with, and support secured by strapping or an elastic bandage." Some fifteen years ago Leriche claimed to hasten recovery from various soft-tissue injuries by injecting procaine; and since then Campbell,[3] Frankel[4] and others have confirmed his findings. Moreover, McIntosh and Petrie,[5] and Henry,[6] found that freezing the skin over a soft-tissue injury with an ethyl chloride spray gives similar relief, with immediate recovery of function. Treatment of ankle sprain by local anæsthesia has lately received fresh support from McMaster[7] in a study of more than 500 cases. His series was drawn from men and women in the Services, whose use of the injured foot could be supervised. Methods used included strapping, procaine infiltration, and cold or hot applications. Some patients were returned at once to duty; others were immobilised for one or more days. The results showed that movement is essential for early recovery; cases treated by rest, whatever the local treatment, were disabled much longer than those who got about from the outset. Best results were obtained in 200 cases treated by procaine infiltration of the injured ligament (in 90% of cases the anterior talofibular). Complete anæsthesia must be established and full activity encouraged; with these methods disability was entirely absent in many cases and rarely lasted over 48 hours. Leriche held the view that pain interferes with the vasomotor changes—first passive and later active dilatation—which favour recovery; and that a local anæsthetic, by abolishing pain, allows the natural vascular changes to proceed. McMaster does not think

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this the whole answer, for it does not explain the success of strapping plus early movement. He suggests that active use improves the circulation, so that tissue metabolism and repair are enhanced and extravasated blood and serum are mechanically expressed from the injured part; the swelling and stiffness produced by stasis are thus quickly reduced.

Special Articles

NEUROSIS AND INTELLIGENCE

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It is often maintained that there is a correlation between neurosis and intelligence, and even between specific syndromes, such as hysteria, and intellectual level. Thus Hollingworth (1920, 1931), who applied mental tests to several hundred soldiers with neurotic and other mental and nervous disorders, found that "except for the psychasthenic group, all the classifications of 'psychoneurosis' fall definitely below the mental level of the average recruit." Similar results were obtained by Tendler (1923), who found a median mental age of 12·0 in sixty civilian neurotics, compared with a mental age of 14·3 in normal controls. Hollingworth found that among his subjects the psychasthenic were superior in intelligence to the neurasthenic, and those in turn to the hysterics. He interpreted these results as giving support to Rivers's hypothesis (1918) that the more psychical symptoms tend to occur mainly among the intelligent and the more physical symptoms mainly among the dull. Tendler's results did not bear out Hollingworth's findings, the hysterics obtaining higher scores than either of the other two groups. It has been suggested that this discrepancy may have been due to the fact that Tendler excluded illiterate subjects from his sample. The results reported by Michaels and Schilling (1936) from their work on psychoneurotics did not support the hypothesis that neurotics are on the average less intelligent than normal people. They used both the Binet and the Porteus tests, and found that the sample of neurotics tested showed an average Binet mental age of 15·0 years, and a Porteus mental age of 14·5 years.

In view of these conflicting results, and partly because of the frequent criticisms of the Binet test in connexion with the testing of neurotic adults (Wells and Kelley 1920, Piotrowski 1937, Krugman 1939), the average scores are here published of some 3000 neurotic men and women in the progressive matrices test of intelligence which is given as a routine test to all incoming patients at Mill Hill Emergency Hospital. This is a perceptual test of intelligence, which divides subjects into five grades, containing respectively 5%, 20%, 50%, 20% and 5% of the total population (Raven 1941, 1942). The most intelligent 5% of the population are in grade I, the least intelligent 5% in grade V.

In table I are set out the numbers of cases in each of the eight diagnostic groups in use at the hospital, the percentages they form of the total population examined, and the average matrices grades of the subgroups and of the whole groups. In general, the men are very slightly below average, while the women are even more slightly above average.[1] This difference between the sexes, although statistically significant, is probably due to external causes (differential selection, &c.) unconnected with neurosis. The fact that the men are very slightly below average in intelligence is also probably due to selection rather than to any connexion between neurosis and low intelligence; it must be remembered that the hospital deals exclusively with NCOs and other ranks, while the (usually more intelligent) officers are dealt with elsewhere. Thus our analysis does not cover a true sample of the whole population, and a deviation of the kind under discussion was only to be expected.

Our results regarding the relation between intelligence and neurosis are in direct opposition to those of Hollingworth (1920) and Tendler (1923). One way in which a reconciliation might be effected is suggested by Babcock (1941), who found that "the lower intelligence of neurotics . . . is caused by weakness in the efficiency phase of mental organisation rather than in ability to abstract and reason" (p. 256). If we accept her thesis that "efficiency of mental functioning is a significant factor which is distinct from level of intelligence" (p. 277), and her demonstration that extremes of neuroticism are related to very low efficiency scores (1940), then it becomes possible to argue that the tests used by Hollingworth and Tendler were of "efficiency," while the test used in this investigation was of "level of intelligence."[2] While the concept of "efficiency" is by no means clear, the evidence for some such division as Babcock suggests is rather strong, and her hypothesis might well be adopted as a basis for further research. The results reported in this paper are compatible with

TABLE I—RESULTS OF PROGRESSIVE MATRICES TEST IN EIGHT GROUPS OF NEUROTIC PATIENTS

Diagnosis	No. of cases		Percentages		Matrices grades	
	M	F	M	F	M	F
Anxiety:						
acute severe ...	131	9	5·0	2·1	3·09	3·00
acute mild ...	409	65	15·5	14·8	3·09	2·95
chronic	759	53	28·7	12·1	3·01	2·62
Hysteria:						
conversion ...	478	90	18·1	20·5	3·27	3·23
dysmnesic ...	103	19	3·9	4·3	3·10	2·42
Psychopathic personality ...	206	56	7·8	12·8	3·00	3·11
Depression:						
reactive	469	117	17·3	26·7	3·03	2·87
endogenous ...	91	30	3·4	6·8	3·04	2·97
Totals	2646	439	...	...	3·08	2·95

TABLE II—PERCENTAGES OF NEUROTIC PATIENTS SHOWING INTELLIGENCE ABOVE AVERAGE, AVERAGE, OR BELOW AVERAGE

Diagnosis	MALES			FEMALES		
	Above av.	Average	Below av.	Above av.	Average	Below av.
Anxiety—						
Acute severe	25·9 ± 3·8	43·5 ± 4·3	30·5 ± 4·0	33·3 ± 15·7	33·3 ± 15·7	33·3 ± 15·7
Acute mild	26·4 ± 2·2	41·6 ± 2·4	32·0 ± 2·3	32·4 ± 5·8	40·0 ± 6·1	27·7 ± 5·6
Chronic	26·9 ± 1·6	42·3 ± 1·8	30·8 ± 1·6	41·5 ± 6·8	45·3 ± 6·8	13·2 ± 4·6
Hysteria—						
Conversion	21·1 ± 1·9	40·8 ± 2·2	38·0 ± 2·2	25·5 ± 4·0	35·6 ± 5·0	38·9 ± 5·1
Dysmnesic	25·3 ± 4·3	40·8 ± 4·8	33·9 ± 4·7	47·4 ± 11·5	47·4 ± 11·5	5·3 ± 5·1
Psychopathic personality	31·0 ± 3·2	37·3 ± 3·4	31·5 ± 3·2	30·3 ± 6·1	30·4 ± 6·1	39·3 ± 6·5
Depression—						
Reactive	26·0 ± 2·0	43·1 ± 2·3	30·0 ± 2·1	29·1 ± 4·2	48·7 ± 4·6	22·2 ± 3·3
Endogenous	33·0 ± 4·9	29·7 ± 4·8	37·4 ± 5·1	36·7 ± 8·8	33·3 ± 8·7	30·0 ± 8·4
Whole series	26·1 ± 0·9	41·2 ± 1·0	32·7 ± 0·9	31·9 ± 2·2	40·6 ± 2·3	27·6 ± 2·1

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[1] In dealing with the results of women, the difficulty arises that the test has only been properly standardised on men. I understand that no great differences between the sexes have become apparent, and that therefore it is probably legitimate to compare the scores of the women included in this survey with the standards derived from male samples. It should, however, be borne in mind that results reported for women are subject to modification if any sex-differences should be found in the general population.

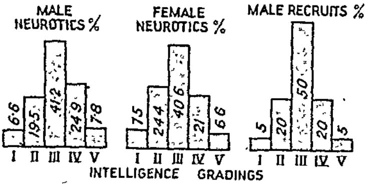
[2] The matrices test is a timeless test, and thus fulfils one essential condition of Babcock's requirements for a test of "level" as opposed to "efficiency."

her view. [illegible] do not, on [illegible] intellectual [illegible] be found i[illegible] [illegible] of mental functioning."

It will be seen that, among both men and women, conversion hysterics are on the average distinctly less intelligent than other neurotics, while dysmnesic hysterics are on the whole of average intelligence, or slightly above average. Patients suffering from chronic anxiety are on the average more intelligent than other neurotics; this is true of men and women alike. Patients suffering from acute anxiety are about average. These trends, as far as they go, seem to bear out Rivers's hypothesis, and support Hollingworth's results. The fact that psychopathic personalities show on the average the highest intelligence among men, while among the women they are the second dullest group, may be significant only in so far as it throws some light on the bases of diagnosis adopted by the respective psychiatrists. More than that our data do [illegible]

Table II shows [illegible] falling into grades I and II [illegible] grade III (average intelligence), and grades IV and V (below average intelligence), separately for the two sexes and for the eight diagnostic groups. With these percentages are given in each case the standard errors, to show the statistical significance of the results. These errors are comparatively small for the men, because of the rather large numbers involved; they are a good deal larger for the women.

The exact distribution of the 2646 male and 439 female cases on the five-point matrices scale is shown in greater detail in the figure for men and women separately. Also included in this figure for purposes of comparison, is a histogram giving the intelligence gradings for 3665 non-neurotic army conscripts (Raven 1941). This diagram brings out the same point as table II. While on the average the intelligence of neurotic men and women is neither considerably above nor considerably below that of non-neurotic men and women, the curve of distribution is distinctly platykurtic for the neurotics, as compared with the mesokurtic type of curve found with normal subjects. In other words, among the neurotics tested there were far less cases of average intelligence (grade III) than one would have expected, and far more cases of either high or low intelligence. For both men and women, we find only about 40% in grade III, while we should expect approximately 50%; this difference is statistically significant beyond any possible doubt. Similarly, instead of 25% in grades I and II, 31·9% of the [illegible] and instead of 25% in grade[illegible] men are in these grades. T[illegible] statistically significant.



Intelligence gradings in 2646 male and 439 female neurotics and 3665 male recruits

As far as they go, these results disprove the belief that neurosis is directly correlated with low intelligence, and rather support the view, often voiced by psychologists and psychiatrists, that it is people of over-average intelligence, as well as people of under-average intelligence, who are likely to become maladjusted to their environment and develop a neurosis, while the average person is less likely to become maladjusted.

One or two minor points arise from the findings. It has often been maintained that depressed and anxious patients are not likely to do themselves justice on an intelligence test, because of their self-centred attitude and lack of interest in the outer world. The figures on the whole do not support this view: depressed and anxious patients are just about average, as compared with the other patients. This is true of both men and women.

It will be seen from the tables that male patients are more often diagnosed as "anxiety" cases (50% compared with 25% for women), while women are more often diagnosed as "depression" cases (33% compared with 21% for men). It should not be concluded that these figures necessarily indicate any genuine sex-difference; most likely they are due to differential selection of cases referred to the hospital, and to different criteria employed by the psychiatrists at the hospital.

SUMMARY

The records of some 3000 male and female neurotic Service patients (NCOs and other ranks) at the Mill Hill Emergency Hospital on the progressive matrices test of intelligence have been analysed.

The neurotic group tested is on the average neither more nor less intelligent than comparable non-neurotic groups.

Taken in conjunction with previous results, this finding supports the view that the lower intelligence of neurotics is caused by a weakness in the efficiency of mental functioning, rather than by their inability to [illegible] gent [illegible] e on [illegible] intelligence.

Patients suffering from chronic anxiety are on the average more intelligent than other neurotics.

The distribution of scores in the neurotic groups is distinctly abnormal (platykurtic); there are far fewer cases of average intelligence, and more cases of above-average and below-average intelligence than would be found in a comparable sample of the normal population.

I am indebted to Dr. W. S. Maclay, medical superintendent, for permission to use this material, and to the Rockefeller Foundation for a grant which made the research possible.

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ASSOCIATION OF PORT HEALTH AUTHORITIES

On Sept. 3 this association held its autumn meeting at Glasgow, where it was able to study the arrangements for the health and welfare of the Merchant Navy described by Sir Alexander Macgregor in a memorandum reviewed in these columns on June 26, p. 807. After a welcome by the Lord Provost, the association heard addresses on port welfare (Colonel Hugh Campbell), hospital facilities for merchant seamen (Dr. A. D. Briggs), medical services for merchant seamen (Dr. Alexander Hutchison), and medical arrangements for dockers in ports (Dr. George Buchanan). These were followed by a discussion summed up by Sir Alexander Macgregor. The general conclusion reached was that although the war has given a much-needed impetus to provision for the health and welfare of seamen, which in practice at the principal ports now works reasonably well, it ought not to be left to chance to decide whether such provision continues and is improved after the war. It should be given priority in postwar planning so as to be stabilised as an integral part of the mercantile marine. The association was glad to hear from Dr. M. T. Morgan that one of its detailed recommendations—namely, the training of sick-bay stewards for the Merchant Navy—is now being considered.

At the business meeting Alderman W. E. Copeland, the president, referred to the recent resignation of Dr. Greenwood Wilson (Cardiff) from the hon. secretaryship, and expressed appreciation of his excellent service during seven years' tenure of the position. A presentation is to be made to Dr. Wilson at some convenient time.

ROYAL COLLEGE OF SURGEONS OF ENGLAND

PRESIDENT'S ADDRESS TO FELLOWS

A MEETING of Fellows was held at the College on July 21, to which members of the Association of Surgeons and their guests were invited. Sir Alfred Webb-Johnson, the president, who was in the chair, said that the council had been encouraged by the opinions expressed at the last annual meeting of fellows and members to call this meeting, and would gladly consider the reintroduction of regular meetings of fellows. They welcomed the increased interest taken by the fellows in the management of college affairs.

The primary examination for the fellowship, Sir Alfred continued, had been made entirely a postgraduate examination with pathology introduced as an additional subject to anatomy and applied physiology. The interval between graduation and entry for the final examination would now be two years for all candidates provided that they had passed the primary and complied with the regulations. The court of examiners had been enlarged to 20, 12 members taking part in each examination. This rota system and the concentration of the examination programme would enable surgeons with many commitments or from distant localities to serve on the court with less interference with their other duties. Two women examiners had been appointed to the boards of examiners for the conjoint examination, one in anatomy and one in midwifery.

Another new departure was the appointment of professors in the college, part of whose duties were performed elsewhere—Professor Sorsby, research professor in ophthalmology, and Professor Gye, director of the Imperial Cancer Research Fund.

The damage done by enemy action to the Royal Colleges of Physicians and Surgeons had opened up the question of the three Royal Colleges working together either in a combined building or in adjacent buildings on some suitable site. The president's suggestion that Lincoln's Inn Fields had great advantages for such a collegiate building was received with applause. The council was prepared to consider alternative sites, but the present building of the Royal College of Surgeons and the adjoining sites owned by the college might provide an area more than sufficient for the requirements of the three colleges and for future developments. In the opinion of the council the suitability of the Lincoln's Inn Fields site should not be lightly rejected as the value of the buildings still standing was estimated at £200,000.

The position in the college of the special branches of surgery was an important matter and the council was sensible of the necessity of catering for their needs in such matters as representation on the council and the granting of suitable higher diplomas. The recent change in the format of the election papers had been designed to emphasise the importance of the council being largely representative of the medical schools and of general and specialist surgery throughout the country. The training of surgeons was now receiving active consideration, and the president advocated an interchange of views between the Royal Colleges of England and Edinburgh and Ireland in regard particularly to examination in the basic sciences, to the place of special subjects in the final examination, and to the length of the interval between qualification and taking a higher diploma. The council had declined a suggestion that fellowship examinations should be discontinued during the war.

Criteria for consultants had been provisionally agreed by the standing joint committee of the Royal Colleges of Physicians, Surgeons, and Obstetricians and Gynæcologists, for the guidance of the newly formed Central Medical Academic Council, composed of representatives of the colleges and of the medical faculties of the universities. These criteria, however, could not yet be regarded as settled.

Representatives of the college had given evidence before the Goodenough Committee. The president reported the definite view of the council that there must be a portal to the medical profession under the sole control of a purely professional body, and the college had therefore disagreed with the suggestion that a university degree should be a sine qua non for medical qualification.

A Representative Committee of the profession was engaged in discussions with the Minister of Health on assumption B of the Beveridge Plan. The Royal Colleges were represented by their presidents, and he himself had insisted that he must be regarded as a representative of consultant surgery. For this purpose the Royal Colleges had held a conference of representatives from all centres in order to obtain the views of consultants throughout the country. The RC maintained that some freedom of choice must be left both to doctor and patient, and declined to countenance the conversion of a free profession into a public service. An individual must be free to enter the medical profession and to practise his profession when registered. The medical profession must have a large say in the organisation and management of a national health service. The administrative structure must allow a generous representation of the medical profession. The health service must be comprehensive in character and the local authorities as at present constituted did not provide satisfactory areas for dealing with the needs of the population. Some scheme of regionalisation was essential. It was the declared intention of the Government that opportunities for private practice should be maintained, and the most sensible and reasonable way of providing for this seemed to be to apply the national contributory scheme only to those who needed such provision. It was generally agreed that in planning for positive health and the prevention of disease the non-medical proposals of the Beveridge report were of greater importance than any revolutionary changes in medical practice. Sir Alfred referred particularly to the improvement of housing, the avoidance of mass unemployment, the provision of children's allowances, disability pay, and old-age pensions.

The meeting then passed resolutions expressing the hope that the council would arrange for meetings of fellows on future occasions, and approving the policy outlined in the president's report.

AFTERCARE FOR DOCKWORKERS

Mr. Ernest Bevin, speaking at the opening of the Dockworkers Rehabilitation Centre at Salford on Sept. 4. said that the guaranteed week for dockers was introduced after the Government had received news through the intelligence service of imminent attack on the seaports which were, as he put it, the mouths of the country. "You couldn't expect men," Mr. Bevin went on, "who are on today and off tomorrow and are nobody's children to be particularly enthusiastic about standing by, and we determined to introduce a guaranteed week right away without arguing about terms." His "nobody's children" have now at least obtained foster parents and the rehabilitation centre which Mr. Bevin opened is an indication that they are taking their responsibilities seriously. Actually doctors have been "rehabilitating" or restoring sick and injured people to health and vigour for some centuries. What is new about it is that their efforts are now being better organised. The Tomlinson report mentioned the EMS fracture scheme and the War Office centres at Kingston, Skegness and Dunblane; the Clyde Basin scheme was described by Mr. Joseph Westwood at the London conference on industrial health in April of this year; the Miners Welfare Commission has set up centres for injured and ailing miners at Gleneagles, Mansfield and elsewhere. But the Salford centre is the first for dockworkers. Attendance which is voluntary is limited to men registered under the Port of Manchester scheme and subsistence allowance is paid so long as earning capacity is lost or impaired.

It was the report of an investigation into sickness absenteeism amongst dockworkers in Manchester that convinced Mr. Bevin that their predominating illnesses, such as sciatica, rheumatism and gastric disorders. and their incapacity from neglected injuries could be best met in such a centre. The Minister of War Transport authorised its establishment under the general financial control of the Regional Port Director, to be administered by a committee under the chairmanship of Mr. Leslie Roberts. CBE, general manager of the Manchester Ship Canal Company. A large house called

Claremont with extensive outbuildings in Eccles Old Road, Salford, which had previously been developed as a hostel and welfare centre for transferred dock labourers, was taken and converted for the purpose. Gymnastic, physiotherapy and social departments, as well as dormitories, have been equipped and placed under the charge of the medical officer, Dr. J. P. Broom. Close coöperation is to be maintained with hospital staffs and the workers' own doctors, and care taken not to interfere with the existing doctor-patient relationship.

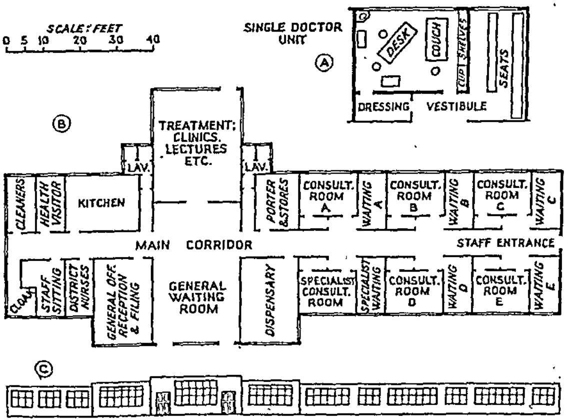
It may be too late to protest against the use of the word "rehabilitation" to describe the process of making sick or injured people healthy and able to work again. For most of its long life it meant the regaining of privileges and reputation; the more euphonious word "restoration" has happier associations. Why not call "Claremont" the Dockworkers Health Centre? But whatever the name the development will be watched with sympathetic interest.

A PLAN FOR A HEALTH CENTRE

The Medical Practitioners Union has published a memorandum [1] with a suggested plan for a health centre to meet the needs of the coming years. They have in mind a building not setting out to be the final pattern but designed for its purpose—a beginning from which we can learn lessons for the future. They consider that every village should have its own centre, however small and simple, as a symbol of a new outlook on health and the health services. No centre would be an isolated unit; it would be in touch with general hospitals and other institutions. The accompanying plan, taken from the memorandum, is designed to accommodate 6 or 8 doctors, and is estimated to need the following additional staff: four state registered nurses; two clerks and one typist; three cleaners; one cook and one kitchen maid; a day porter; and for night duty a porter, a nurse and a clerk. The work to be undertaken in the centre would include that now done by general practitioners, district nurses and health visitors; that of municipal clinics with the possible exception of those for venereal disease; simple physiotherapy and remedial treatment; and dispensing. The memo also suggests that a dentist should work at the clinic, undertaking routine examination of children, fillings and other minor treatment. He would use the specialists consulting-room, or in a smaller clinic the treatment room.

Each general practitioner unit in the centre would have three rooms connected by a vestibule. The consulting-room, 12 ft. by 6 ft., would contain a desk, a couch, a dressing-trolley, a filing cabinet, shelves and cupboard. *After consultation, patients would pass directly from the dressing-room to the vestibule.* The waiting-room also opens into the vestibule, and this arrangement should make it impossible for those waiting to overhear what goes on in the consulting-room. The treatment room could be used for routine dressings, minor operations, physiotherapy, massage, and in the afternoon for clinics, lectures and films. The district nurse and the health visitor would each have a separate room. The staffing of the dispensary, the memo suggests, "is not a matter for the medical profession," though it has occasioned a good d[illegible] pharmaceutical profession [illegible] tea for those waiting, and [illegible] presumably to be eaten in their own offices. It could also be used for the issue of milk during school holidays and of supplementary foods to infants and nursing mothers.

The somewhat unattractive elevation shown in the figure is not an essential part of the scheme; there is a suggestion in the text that civic patriotism will demand startling experiments in modern structure, "intended . . . to emphasise the unique character and importance of the health centre."



In England Now

A Running Commentary by Peripatetic Correspondents

It was very late at night or very early in the morning—the Army calls it 04.00 hours—and everybody in the theatre was tired and weary. Even the most dramatic operation was unlikely to produce any response from the audience. Fortunately we were at the end of our list. The last man was carried in and placed on the table. His card was read aloud: "Profuse uncontrollable hæmorrhage from depths of wound, packed, please remove packing in 24 hours." We did, and the uncontrollable hæmorrhage restarted. A despondent surgeon stared disconsolately at the wound while a weary orderly tried without success to staunch the bleeding by pressure. Within a few minutes there was a pool of blood. "This is no good," said the surgeon, "put on a tourniquet, and I'll open the wound and find the bleeding points." What was a deep dark hole was soon changed into an open flat wound, but no vessels were to be seen. "Let go the tourniquet, *slowly*," said the surgeon, and with a large hæmostat in each hand he stood ready, poised over the wound. Everyone was tense as the rubber bands were loosened. The hands holding the artery forceps began to tremble a little from the strain. "Is it off?" hissed the surgeon. "Yes, Sir," came the reply. He put his forceps down sadly. It was too near breakfast to risk airing my scientific curiosity, so I kept quiet as the dressings were applied, but I would like to know why that bleeding stopped.

* * *

When one is busy from morn till night amidst familiar surroundings, in one's home, in the wards or outpatient departments at hospital, one is but half [illegible] that are [illegible] Suddenly [illegible] inating as [illegible] full truth. So it was today when I visited in consultation a house that brought home to me suddenly and forcibly the changes that are abroad. I drove down through the golden afternoon to a typical English parsonage, old, rambling and sun-drenched, with verandahs and open windows looking towards the sea. There was good furniture there and faded chintz. A path from the study door led under a yew-tree to the small church whose bell still lies silent though others ring again. The garden was large and held great elms where rooks were building, and there had been lawns and roses and a paddock; and, as the vicar put it, "the best tennis-court in Hampshire." He had been there twenty years, and it was obviously the home of a man of taste and means, where children had [illegible] born and had played and laughe[illegible] climbed trees, and fallen and be[illegible]forted. There was quiet [illegible] gentleness of hearts a[illegible]

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[1] W. 103. "National Health Centres." Copies may be obtained from the secretary of the MPU 55/56, Russell Square, London, W.C.1.

English heaven." And now, as I saw it, the front door bell was broken, and dust lay in the large servantless rooms, and there were no gardeners, and the grass was kneedeep on the tennis-court, while no man could tell where lawns began and the flowerbeds ended. Outside were the huge, ugly hangars of a new aerodrome, while between the house and the sea was a grim array of camouflaged oil tanks. In the drawing-room they showed me the photographs of four sons, all in uniform, and they told me how the eldest never came back from Dunkirk nor the youngest from a bombing raid over Germany. Somehow it made me see and bitterly regret how thorough were the changes in the old order which was familiar to me, and which had brought me so much happiness. So I prayed as I drove home that the restlessness of the new age would find tolerance for the peace and the quiet of English homes such as that I had just visited.

* * *

My house surgeon, a tough South African, was having supper with us. We were talking of boxing, for which he had won many prizes, when he threw out the remark, "I originally took up boxing at school to defend my young brother George." Sensing a story I pressed him further, and this is what he told me. While the other boys at school were reading thrillers and adventure stories young George would be busy with his sewing. Naturally he came in for more than his share of ragging. Hence the boxing. One day, when he was not quite sixteen, one of the masters called him a young so-and-so. George straightway packed his bag and disappeared. No trace of him could be found for six weeks, when his parents ran him to earth in a second-rate lodging-house earning a living by taking in dressmaking. Neither blandishment nor threat could induce him to abandon this life, much to the disgust of his father, a stalwart veld farmer. A few months later the family were startled to see in bold headlines in the local paper "Ex High-school Boy Wins £1000 Dress Designing Competition." Young George had set his foot on the ladder to fame. This time his father arranged to send the boy to England to learn his trade thoroughly, and in a few years George was earning a four figure income, as chief designer to a firm whose name is a household word in fashionable circles in London, Paris and New York. But now he is in the RAF, and in charge of a heavy bomber. On the way home from a bombing raid young brother George hands over to the second pilot while he gets on with his embroidery. Apparently he no longer needs a protector.

* * *

Every writer comes to realise sooner or later that too great deliberation in composition usually defeats its own ends. Tampering with sentences which have flowed freely enough from the pen nearly always ends in disaster. Of course, there are successful writers who tell us that they recast nearly every sentence; and I have heard that in the British Museum there is a MS by a literary giant showing almost as many alterations as could be made. But for most of us, our best work comes from flinging ourselves into the job with the intention of "putting it across" to the reader rather than trying to produce polished sentences. To be an effective public speaker one must be a fervent believer in one's thesis: conviction gives birth to eloquence. It is the same in writing. The novice, the copyist, the ill-informed critic, and above all the literary charlatan proclaim themselves to the world for what they are worth. The literary style of a Harvey, a Jenner or an Addison is not fortuitous; it is the by-product of lifelong devotion to a high ideal.

Faute de mieux, as I would have admitted at the time, I turned, during a book famine in North Africa, to the Everyman edition of "The Essays or Counsels, Civil and Moral, of Francis Bacon, Lord Verulam" containing an excellent introduction by Oliphant Smeaton. It says much for the status of this book in the rich field of English literature that it should be No. 10 of a series now including nearly 1000 classics. These essays seem to provide the perfect example of a man writing with that consummate ease which is born of conviction. Although only 36 when he expressed his views on such topics as Discourse, Negociating, Expense, Ceremonies and Respect he focused on his writing such a wealth of scholarship and experience that his pronouncements are of comparison with the prophetic books of the For soundness of judgment and pithiness of s would be difficult to imagine how any living write improve on this collection of essays. The bitter of human experience in an incredibly crowd provide the mainspring for his faultless Englis doubt the archaic constructions repell the modern were the substance of these essays rewritten colloquial style of the present day by a Shaw or they might prove not only a "best-seller" but a climax to a great literary career. One of the many that the budding writer can learn from Bacon is th of an arresting opening sentence. "As the bi living creatures at first are ill-shapen, so are all i tions, which are the births of time." "I cann riches better than the baggage of virtue." A famous opening: "He that hath wife and c hath given hostages to fortune; for they are imped to great enterprises, either of virtue or of misch

When my batman lifts my mosquito net at 07·0 and gives me a cup of tea, he now knows that h also place on my bed *The Essays of Francis* and then I feel that in my right hand are pleasu evermore.

* * *

In a picture-shop in King Charles II Street Picasso's *La Belle Hollandaise*, and spent ten n enjoying its placid beauty. "How much is it asked the artist-shopkeeper. "There's a reserve thousand on it," he said. "Let you know in a few I murmured as I went out; but he was not amu

* * *

A colleague's wife has secured a nannie for h baby. My congratulations were faintly tinge envy, for a full-time resident female assistant co too favourably with our two-half-days-a-week (un helper who comes when weather permits. I was s appeased when I heard that the nannie has taken a in psychology, and not altogether surprised learnt that the older child was not making a ver factory adjustment to her dowager status. They me in to have a good talk all round. Nannie keen but dull and her psychological training ap to have been superficial. However I did my be suggestions for better management of the situati bulletins at intervals confirmed my impressio nannie's understanding of the child mind did very deep. Last night I met my colleague over of beer. "By the way," he remarked, "it tu that we made a mistake over nannie. It wasn't logy she took a course in, it was phrenology." one down with a bump, as Freud might have sai

Infectious Disease in England and Wale

WEEK ENDED SEPT. 4

Notifications.—The following cases of infectious were notified during the week: smallpox, 0; fever, 2206; whooping-cough, 1928; diphtheri paratyphoid, 14; typhoid, 11; measles (ex rubella), 674; pneumonia (primary or influenzal puerperal pyrexia, 171; cerebrospinal feve poliomyelitis, 16; polio-encephalitis, 1; ence lethargica, 4; dysentery, 238; ophthalmia neona 91. No case of cholera, plague or typhus fev notified during the week.

The number of civilian and service sick in the Infectious of the London County Council on Sept. 1 was 1577. Du previous week the following cases were admitted: scarl 226; diphtheria, 45; measles, 15; whooping-cough, 30.

Deaths.—In 126 great towns there were no from scarlet fever, 3 (0) from enteric fevers, 2 (measles, 8 (0) from whooping-cough, 9 (1) from theria, 69 (13) from diarrhœa and enteritis und years, and 7 (0) from influenza. The figures in theses are those for London itself.

Blackpool, Sunderland and Nottingham each reported from an enteric fever, Liverpool had 7 fatal cases of diarrh

The number of stillbirths notified during the we 191 (corresponding to a rate of 31 per thousan births), including 22 in London.

Letters to the Editor

TREATMENT OF MYASTHENIA GRAVIS

SIR,—'Prostigmin' (Roche) was introduced into the treatment of myasthenia gravis some nine years ago, and 18 of our patients have since used this drug. We hope to publish shortly a full account of our experience, but a summary may meanwhile be useful as a guide to others. [illegible] ooks give the [illegible] an interesting [illegible] be used, with the utmost care, for the occasional temporary relief of the most distressing symptoms. We quote three typical views from articles written in 1942.

"It is not yet possible to use the drug by repeated injection as a mode of treatment for myasthenia gravis, though its occasional administration may enable the subject to meet special calls from time to time."

"There is no certainly effective method of treatment. . . . Repeated administration may lead to grave increase of weakness after the effects of a given dose have passed off."

In a third book glycine is first mentioned as "worth a trial," and eserine or prostigmin advised with the admission that the latter gives "more satisfactory results."

We intend to show that these verdicts, though passed by high authority, are over-cautious, and that their gloom can fortunately be lightened by the experience of others. Seven years ago (*Lancet*, 1936, i, 1157) we showed that prostigmin was well tolerated by our patients who had taken it daily for a year. Our favourable early report has since had widespread confirmation and we need only quote the opinion of the two groups of physicians responsible for the largest number of patients. Viets and Schwab (*J. Amer. med. Ass.* 1939, 113, 559), whose 44 patients had taken prostigmin several times a day for periods up to three years, gave as many as 25 tablets daily and found that "once the dosage was [illegible] effects from accumulation of the drug was observed." More recently Eaton (*Proc. Mayo. Clin.* 1942, 17, 81), surveying his results with prostigmin, came to the encouraging conclusion that the majority of patients "are enabled to lead relatively useful and happy lives."

Our own results have been as follows. Five patients required treatment only for short periods because their symptoms were slight and localised or because they developed a long remission. Five patients have died and eight are still under treatment. The cause of death was tuberculosis of the lungs and peritoneum in one case, menopausal melancholia and refusal to take food in another, lobar pneumonia in a third, and respiratory failure in the remaining two. In view of the suggestion that grave weakness may be a sequel to the use of prostigmin we must point out that our fatal cases were all severely affected before treatment and that they took the drug daily for 1, 3, 5, 6 and 8¼ years respectively. The two patients who died of the disease had enjoyed good remissions after the intensive administration of prostigmin during previous respiratory crises. Four of the eight patients under treatment earn their living and the other four do active housework. There is no question of a fortunate remission; all are quite helpless without the drug, although fluctuations for better or for worse are seen from time to time in corresponding changes in dosage. One case-history will illustrate the advantage of adequate treatment.

[illegible] ed from the disease for 11 years. [illegible] but was advised that she should [illegible] not more often than three times daily. She became convinced that the greatest wisdom would be to take no drug at all, and for seven years she stayed at home, often unable to go upstairs without help and accepting nasal regurgitation as a normal feature of tea-drinking. In February, 1943, on our advice, she began with great apprehension to take prostigmin regularly. She has since taken 12 tablets daily timed to suit her convenience. She works 4½ hours daily, goes out to entertainments in the evening, enjoys her meals and needs no help at any time.

Dosage depends on two main factors—the fluctuations of the disease and the regularity of the patient's activity. It is therefore simple to prescribe for stable patients who require greatest strength at regular times. Those who lead a more active life must be allowed to use their discretion. For instance, a ration of 15 tablets daily is allowed, and the patient takes them to suit her requirements. Atropine gr. 1/100 is also taken two or three times daily if and when required. Our patients all take [illegible], ephedrine or potassium [illegible] reduce the amount of [illegible] needed. Patients sometimes complain of increased weakness after the effect of prostigmin has passed, but our experience shows clearly that this "after-weakness" is not cumulative and those who take the most frequent doses are in fact free from it. It does not justify undue restriction of treatment.

Insulin, in spite of its well-known dangers, is given in diabetes to restore health and efficiency, and no-one would suggest that its use be restricted to the treatment of coma. Nevertheless the authorities we have quoted would have us limit the use of prostigmin in myasthenia to the alleviation of the most unpleasant symptoms. Those with the greatest experience in the treatment of myasthenia have found that prostigmin can and should be given adequately for the relief of all symptoms.

L. P. E. LAURENT.
Basingstoke. MARY WALKER.

"FORWARDS (WITH RESERVATIONS)"

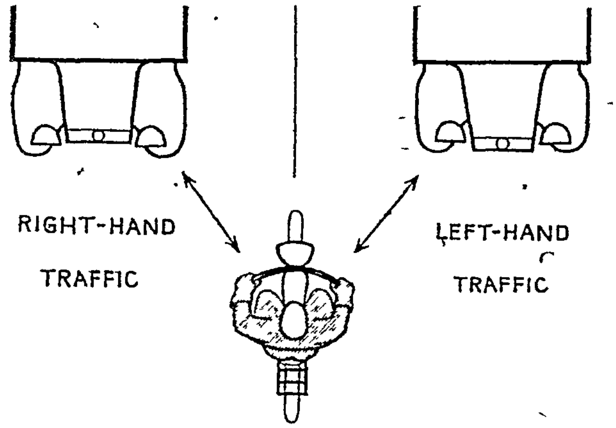
SIR,—"The public, we believe, will demand that the same medical advantages shall be available to every member of the community, and this is the first requisite for securing the highest quality of service." So you write this week—and it is certainly necessary, as you imply, that the public conscience should be stirred about this matter; but there is a world of difference between this and insisting that every member of the public should have the same medical attention, which is what you seem to mean by it later on. Meals which would tempt one person will revolt another, and personal idiosyncrasy is even more marked when ill. Can you suggest any reason why those who are accustomed to a higher or more comfortable standard of living should have their time of sickness made into a time of acute physical and mental discomfort as well? Surely medicine cannot, in this stage of civilisation, be run on the same egalitarian lines as the prisons! Personal medical treatment is a human service: as such it is bound to take into account the human aspect of the patients; and—until we have officially become a classless society—comfort and social status count greatly with some. Our medical services should indeed be available to everyone, but they need not be the same either in kind or in cost. It is administrative con- [illegible] s which would have every [illegible] doctors, who know how very [illegible] oppose this on every ground. [illegible] grounds are we justified even in raising the hope that everyone will be able to have the best? To get the best means, in these days, an ever rising standard, and if the standard is to rise there must always be some better treated than others, whether they be favoured rich, favoured poor, or—as at present—favoured service casualties. To do away with what, in many ways, is the best and is certainly the most humanly conducted part of medical practice seems a queer way of improving the whole. Doctors are not machines that can be moved about at will, and any service that overlooks the individuality of the doctor (as your redistribution scheme seems to imply) can only lower the standard of service.

May I add some constructive proposals? Though perhaps novel in form, they are strictly "democratic" in the true meaning of that misused word which should imply not only regimentation but the greatest freedom for everyone compatible with benefit to all and harm to none. First of all let all dependants of NHI patients and those of similar status be included in something like the present panel system, with of course added diagnostic, hospital and other facilities. Let those over this income be recommended to join one of the mutual medical insurance societies—like the BPA—which will afford them all the facilities they are likely to want and prevent any heavy doctor's bills. As part of its comprehensive medical scheme the Government should also contribute pro rata to these societies for those covered, and any NHI patient should be allowed to opt out into such society if he wished. This would soon show whether people really wished private practice to continue and would put any benefits it may have within the reach of practically all. Finally let there be a " floating " sixpence or shilling to be used to increase the capitation fee in sparse, rural or unpleasant areas. This would cause present inequalities of distribution to be rectified by the doctor's own choice, and even if the inducement is the very mundane one of remuneration it would be both elastic and effective, and avoid the worse evils of regimentation or compulsion.

Winsford, Cheshire. W. N. LEAK.

DISLOCATION OF THE HIP-JOINT

SIR,—In the Army posterior dislocations of the hip are seen most often in motor-cyclists, in whom the force is applied to the knee or leg with the hip in the flexed unstable position. The dislocation may be associated with a simple or compound fracture of the leg or knee-joint, which may claim all the attention of the surgeon with the danger that the hip may be overlooked. Two such cases have been seen recently, one remained undiagnosed for three days, the other for one day. The importance of such a mistake cannot be exaggerated, and it is essential in all traffic accidents of the leg, especially in motor-cyclists, to keep in mind the possibility of a posterior dislocation of the hip and to examine the patient to exclude it.



In England the dislocated hips seen in despatch-riders and due to head-on collisions were on the right side, but in North Africa the two seen due to this type of accident were on the left. This might be explained by the change from left-hand to right-hand traffic (see diagram). In the former case the right knee is the vulnerable one, while in the latter it is the left knee.

S. GLASER.

VITAMIN B_1 AND SHOCK

SIR,—We were much interested in your leader of May 1. Dr. Margaret E. Greig and I have recently completed further experiments on this problem, which may answer some of your questions as to the mechanism of action of thiamine (aneurine) in the therapy of shock.

An unstable equilibrium exists in the organism between thiamine and the coenzyme cocarboxylase:

$$\text{Thiamine} + \text{phosphate} \rightleftharpoons \text{cocarboxylase}$$

In dogs subjected to shock from hæmorrhage, and also in animals in which anoxic anoxia was produced by allowing them to breathe nitrogen-oxygen mixtures of low oxygen content, dephosphorylation of cocarboxylase occurs, the reaction proceeding to the left. On the administration of thiamine to animals in post-hæmorrhage shock, or on the administration of oxygen to dogs in anoxic anoxia, the reverse takes place, the reaction moving to the right with synthesis of cocarboxylase. As cocarboxylase is distributed throughout practically all cells of the body, and as it is a coenzyme essential to the metabolism of carbohydrate it would seem that its destruction might bring about far-reaching disturbances in the organism.

We are inclined to believe that the dogs having high initial levels of plasma-thiamine reported in our third paper do not go into shock at all, since they do not usually show a prolonged hypotension before death but die suddenly, shortly after the last bleeding, and show few of the pathological changes at autopsy commonly associated with the shock syndrome. The fact that the group of dogs having intermediate plasma-thiamine levels did go into shock makes us believe that an average thiamine content of tissues is probably inadequate for maximum resistance to shock.

We have also noted that, as the animal sinks into shock, a rise in plasma-thiamine content parallels the dephosphorylation of cocarboxylase described above. Since thiamine is known to be more diffusible than cocarboxylase, we presume this increase in plasma-thiamine to be due to diffusion of the thiamine liberated by the dephosphorylation of cocarboxylase from tissue cells into the extracellular fluid and thence into the blood-plasma. Thus the level of plasma-thiamine is a function of the equilibrium between thiamin + phosphate, and cocarboxylase. As this equilibrium is influenced by environmental conditions, such as oxygen supply, amount of substrate, integrity of other enzyme systems and many other factors, the level of plasma-thiamine is not a reliable index of the cocarboxylase content of the tissues.

This work may supply the answers to some of your questions. There is a greater need for thiamine in shock induced by hæmorrhage because of the dephosphorylation of cocarboxylase. Thiamine exerts its beneficial effect by causing increased synthesis of cocarboxylase. The usual thiamine reserves of dogs are not sufficient to meet the increased demands of shock. Whether or not this be true in man has not been determined. We have not yet used thiamine in shock other than that induced by hæmorrhage.

There is no reason to believe that cocarboxylase should be the only coenzyme inactivated in shock induced by hæmorrhage or in anoxia. We are now investigating other vitamin-coenzyme systems. The therapeutic effect in shock of vitamins, enzymes and substrates, both with and without blood substitutes, is being examined.

Dept. of Pharmacology,
Vanderbilt University, Tenn. WM. M. GOVIER.

CANNABIS INDICA

SIR,—Your annotation of Sept. 4 prompts me to relate a personal experience of hypersensitiveness to cannabis indica. As a resident in hospital many years ago I took a minimal pharmacopœial dose of the tincture as supplied by a reputable firm. An hour later I felt dizzy and weak on the legs and lay down, little thinking that before long I should pass very uncomfortably into unconsciousness for three hours. Consciousness returned in waves, and after two more hours I was able to stagger about and vomited violently. For the next two or three days my sense of time was disordered—five minutes seemed interminable. I was told that my temper was unusually bad. Several years later I was considering using this drug on a case of obstinate asthma and thought I would first see if an entirely different sample of the tincture had a similar effect on myself. By way of precaution I took only a tenth of the original dose; the effect was not so severe, but bad enough to determine me never to repeat the experiment or use it on any of my patients.

Wokingham, Berks. WILLIAM C. FOWLER.

CALIBRATING THE PELVIC CANAL

SIR,—Mr. Reddington boldly says that X-ray measurement is unnecessary to determine obstetric disproportion. I agree with your leader of Aug. 7 that the radiologist cannot supplant the clinician, but if we are to progress we must use every available means to help us assess disproportion in the primigravida. We all know that the nature of the uterine contractions, the degree of moulding of the fœtal head, and the psychological state of the patient cannot be gauged except during labour. But in doubtful cases it is a real help to have an accurate measurement of the bony pelvis and of the size of the fœtal head; and X-ray technique is more precise than clinical examination. If a trial labour is decided upon, it is an advantage for the obstetrician to have at his

disposal all available information. Mr. Reddington writes of possible damage to the fœtus by X rays; but such damage has never been proved and surely cannot occur in the
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determination
ken.

I would not g
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been made,
benefit of ar
Such measurements have saved some patients from a second cæsarean operation. They are of special value when there has been a previous stillbirth, for in these cases a timely induction gives most satisfactory results.

Lydia Beynon Maternity Hospital,
Newport, Mon.
NORA L KEEVIL.

LIBRARIES AND LEARNED PERIODICALS

SIR,—The plea made by the librarian of the London School of Hygiene in your issue of July 17 for a repre-
body to arrange for the best
vailable copies of scientific and
l the gaps in libraries caused by
lcomed by many who remember
the difficulties experienced in obtaining such journals,
cted for them, in the
war.

Catalogue of periodicals in British libraries to which Mr. Barnard refers in his more recent letter (Aug 21) may perhaps be needed after this work of allocation has been done, but I hope that his larger scheme for reviewing present holdings of periodicals in libraries so that there may be an interchange of stock to eliminate broken sets and to build up complete sets where these are most needed will receive priority of support from library authorities and from any body that may be considering the granting of funds to aid in postwar library reconstruction

The preliminary survey of holdings of medical periodicals which has been proceeding with such promise of success under the auspi
section of the Library
ness of the more en
coöperate in such a reform.

Bureau of Hygiene and
Tropical Diseases, W C.1.
R. L. SHEPPARD,
Secretary.

FERTILITY

SIR,—Dr MacDonald in his letter of July 31 gave what he regards as statistical evidence against Ogino's theory of the fertility period. He analysed a series of 100 cases in which conception followed a single coitus, and his fig 1 arranged these according to the date of coitus in the menstrual cycle Allowing for experimental error, he showed that conception followed coitus on all but the first four days of the cycle, and while he admitted a greater probability of conception between the 8th and 12th

To
more
lengt
He says that they "kept no records of their menstrual cycles for the most part, but they were asked 'What is the usual interval from the first day of one flow to the first day of the next?'" Even this method of questioning showed that 39 out of the 100 did not have a regular cycle of average length 28 days

Holt found that one-quarter of the female population have a short cycle, of less than 25 days, so one-quarter of Dr MacDonald's cases may be assumed to have fallen into this group These would account for the incidence of conception between the 5th and 14th days. The commonest cycle form (25–30 days) would account for the incidence of conception between the 7th and 19th days, and the overlapping of these two groups would produce the peak incidence on the 10th day. The less frequent cycles of 31–36 days would account for all conceptions between the 10th and 25th days, which tend naturally to diminish in incidence, as is clearly shown in fig. 1 except that there is a sudden rise on the 21th and 25th days

The rising
together with
dates, may we
in delaying ovulation. Dr. MacDonald states that 95% of the women were wives of Service men. In times of social insecurity the prospect of pregnancy is often distressing, and it is possible that during the weeks preceding their husbands' leave some of these women become so anxious on this score that ovulation was postponed and consequently coincided with the date of coitus (The fact that there was only a single coitus is perhaps significant) Emotional excitement from anticipation of the husband's return might have the same effect

In his fig. 2 Dr McDonald shows the dates of fertile coitus in 61 cases said to have an average cycle of 28 days. This graph would certainly disprove Ogino's theory if the cases in question had an exact cycle length of 28 days, but no such assurance is given The use of the word "average" may be taken in two ways; as a true mathematical average, or as an assumption on the part of the patient that she menstruated "about the 29th day." From the data given, this average obviously is not a true mathematical average, for then it would include cases with short cycles at one end of the series and long cycles (31–36 days or more) at the other, and Dr MacDonald could not present it as evidence against Ogino's theory. More probably the average is an assumption by the patient. Holt has clearly shown how inaccurate these assumptions are in reality, and—since they are not facts—they cannot satisfactorily be used as evidence

Dr. MacDonald gives no information on the regularity of the cycles over the whole group, nor the state of physical health of the subjects—factors that Holt considered essential
Before hi
it would
identical cycle form, and before he could reasonably discredit Ogino's theory he would have to show that conception took place outside the estimated fertility period of the particular woman, in the absence of any of those physical and psychological factors that are already known to disturb the regularity of the cycle In my opinion the graphs appear to prove rather than disprove Ogino's theory, but they also demonstrate the possible sources of error in applying it to contraception. Holt has drawn attention to these errors, and has recommended specific precautions against them

F. A. FRANK

Obituary

WILLIAM PASTEUR

CB, CMG, M D LOND, F R C P

in his 88th
e complete
of a team of
experts today Pasteur qualified from University College Hospital in 1880, and after postgraduate work in Vienna took his MD Lond. and was appointed medical registrar to the Middlesex Hospital. Here he became successively assistant physician in charge of the children's department, assistant physician to outpatients and then full physician till his retirement in 1921. He was also physician to the Queen's Hospital for Children, Hackney. He served the
and distinction as dean, as
on hygiene and on medici

and for the
worked for
the incorporation of the London medical schools within the university.

The Pasteurs came from Geneva, the father was a director of the Oceana Company, and William spoke both French and German fluently. This gift of tongues proved a boon to his colleagues and to foreign visitors,
hysician to the French
ing the last war as con-
France, he was awarded
the CB and CMG, and it was during these strenuous years that the Medical Society of London chose him as their president. As became a physician to a general hospital, Pasteur's medical interests were wide, but nervous diseases and their relation to respiratory conditions were his specialty, and his many papers to clinical societies included an account of an epidemic of poliomyelitis in members of the same family, while in his

Bradshaw lecture of 1908 he discussed massive collapse of the lung after operation.

Tall and handsome, with courtly and gracious manners, Pasteur was kind to his patients, unsparing in his work for his students, and considerate towards his colleagues. In his younger days he had been a keen mountaineer; he was also an excellent musician, and after his retirement to Tunbridge Wells he was able to indulge his enthusiasm for gardening. In 1890 he married Violet Sellon, who survives him with two daughters. Their son was killed in the last war.

A. F. V.

CECIL PRICE-JONES

M B LOND

Dr. Price-Jones died on August 27 at the age of 80 at his home in Radlett, after a long period of invalidism due to a fracture of the femur. In this age men often give their names to motor-cars or aircraft: Price-Jones gave his, more than twenty years ago, to a curve essential for the diagnosis of Addisonian anæmia. Through his work on red-cell diameters he has become (so to speak) a physical sign recognised throughout the world; but to those who worked and played with him, at Guy's Hospital, at University College Hospital, and in his own home, he was a friend with rare and unexpected gifts. He played the cello and the piano; he had a palate for wines; his water-colour sketches had the skill and charm peculiar to the work of many amateurs of the last century; he was erudite about the habits of slugs and snails; he was a gardener who had planned and planted his own plot; he loved the sea and ships and strange countries; and in conversation he showed a pretty though often caustic humour.

After qualification and a time in his father's practice at Surbiton and as a medical officer of health for Kingston-on-Thames, he became assistant bacteriologist at Guy's Hospital. Here he began his work on the development and size of the cells of the blood, which he was to pursue at intervals throughout his life. A few years later he went as assistant pathologist to the Middlesex Hospital cancer research laboratory and during the war of 1914–18 he served in the BEF with the RAMC. After the war he joined the late Professor Boycott in the Graham research laboratory at University College Hospital and continued to apply statistical methods to hæmatological problems. The accuracy of available methods of estimating hæmoglobin is once more in the melting-pot; but that used by Price-Jones is still the standard method in this country, and his original instrument agrees so closely with the new standard of the National Physical Laboratory that his figures for the hæmoglobin level of English men and women, published in the *Journal of Pathology and Bacteriology* in 1931 and 1935, are likely to stand the test of time, though it is possible that some adjustments may have to be made if the value of the standard is corrected as knowledge advances. He was aware of the apparent discrepancy between the normal levels of hæmoglobin in England and America; "so," as he says in one of his papers, "I went to Boston" to try to solve the meaning of this discrepancy. The discrepancy remains; but the chuckling delight with which he propounded his own solution—namely, the effect of the exhaust of Americans cars upon the hæmoglobin of the man in the street—is not easily forgotten.

He will, however, be chiefly remembered for his work on the diameter of the red cell on which he published his first paper in 1910. This was followed by a series of further papers dealing with red-cell size in different pathological conditions and following treatment, demonstrating particularly the unique character of the red-cell-diameter distribution curve in Addisonian anæmia, work which he summarised in his classical monograph, published in 1933, entitled *Red Cell Blood Diameters*. By his analysis of the distribution curve of red-cell diameters Price-Jones was able to unravel many problems in the ætiology and differentiation of different types of anæmia. He gave hæmatologists all over the world a new tool; but he also did more than this, he demonstrated the importance and value of applying statistical methods to human pathology. What he did for red-cell size and hæmoglobin is gradually, but only too slowly, being done for other factors in the human body. He taught us that unless we know what are the limits of normal variation in any human factor we cannot claim that what we find is abnormal or assess the significance of the abnormality.

WILFRED NOEL PEMBREY WAKELEY

M D LOND; MAJOR R A M C

Major Wilfred Wakeley died suddenly while on active service on Aug. 26. Like his elder brother C. P. G. Wakeley, he was educated at Dulwich College and King's College Hospital, and after qualifying in 1930 he held resident appointments at King's, the Belgrave Hospital for Children and the West London Hospital. He spent a short time in general practice at Margate before he was appointed assistant medical officer at the GPO. Wakeley was a keen territorial and also had his pilot's certificate. At the outbreak of the war he was in charge of the medical arrangements of an anti-aircraft unit, but was soon posted to the division where he became DADMS in 1942.

Lieut.-Colonel D. J. MacMyn writes: "In his student days at King's Wilfred Wakeley was a robust and reliable three-quarter. He could tackle like a horse, and always came up smiling, even from the mud at Dog Kennel Hill. His carefree, amiable disposition made him popular, yet beneath a light-hearted exterior there lay a seriousness of purpose and sincerity which earned respect. After a lapse of some years I met him again in the division in which he was serving as DADMS at the time of his death. Here he found full scope for his industry, unselfish enthusiasm and cheerful loyalty. Happy though he was at his office table, he seemed never happier than when he answered the challenge of the wild lonely Highland hills and marched long distances and climbed great heights 'for the fun of it.' His severest critic was himself; of others he had a kind word and a generous thought."

THE LATE DR. BYRNE

Dr. Austin Byrne whose death was reported in our issue of Sept. 4 was one of the last British doctors in the Egyptian ministry of health. Prof. Cecil Alport writes from Cairo: Byrne's charm of manner, sympathetic nature and unfailing courtesy made him popular both in English and in Egyptian government circles. The order of the Nile was conferred on him in 1937 and in 1940 the Royal College of Physicians of London elected him to their membership. In August of the following year he was appointed by the council of ministers to the important post of president of the International Quarantine Board and technical adviser to the quarantine administration of Egypt. Dr. Byrne was due to retire in 1940, and he had visions of going home and spending the rest of his life breeding race-horses. Before the last war he was known as one of the best gentleman riders in the East and in 1912 he trained and rode the winner of the Lahore Grand National, one of the blue ribands of the turf of India. But his duty kept him in Egypt, and he worked himself to death. At the outbreak of this war he became the chairman of the committee which organised medical arrangements for air-raid precautions in Cairo, and already in 1939 he had become liaison officer between the Egyptian government medical services and the British and Allied Forces in Egypt. His life was a full one, devoted to the health and welfare not only of the Egyptian people but also of the British troops in Egypt; and the *London Gazette* recently stated: "without Dr. Byrne's help the treatment of prisoners of war would have been an insurmountable problem."

DR. FREDERICK MACPHERSON TRAILL SKAE, who died recently, belonged to a family who have done much in organising the care of the mentally ill. He was a grandson of Dr. David Skae (1814–73), physician-superintendent of the Royal Mental Hospital, Morningside, Edinburgh, where he introduced many reforms and new ideas. His father, Dr. Frederick W. A. Skae as inspector-general of asylums and hospitals in New Zealand organised the mental hospitals and later the general hospitals of the Dominion. Dr. Skae himself was for some time assistant to Sir John Macpherson in the Stirling District Asylum and later spent some years in general practice in the Federated Malay States. He returned to Scotland and served during the last war with the Orkney RGA. In 1922 he was appointed assistant to Prof. Yule Mackay at Dundee University College and to Prof. Rutherford Dow.

Notes and News

TUBERCULOSIS NURSING

THE Minister of Health is leaving no stone unturned to get the staff for nursing tuberculosis In circular 2858 dated 10 ix 43, he reminds medical officers of health of his suggestion that they should review the staff of all hospitals under the control of local authorities and encourage nurses who can be spared to transfer to sanatoriums Small authorities, he thinks, might achieve the same result by joint action, and they might transfer nurses to the tuberculosis institutions temporarily, in rotation for periods of 3–6 months He calls the attention of the authorities themselves to the provisions of the General Nursing Council under which nurses in training in general and fever hospitals may be seconded to sanatoriums for a part of their course Schemes of affiliation may also be arranged between general and special hospitals including sanatoriums, under which a nurse can take her preliminary examination after 2 years in the affiliated hospital passing to a general hospital for a further 2 years training before taking her final state examination

recreation and amusement He specially asks that complaints shall be brought to his notice

MALARIA AT FREETOWN

FREETOWN, the capital and principal port of Sierra Leone has a world wide reputation for malaria, and the present abnormal demands have proved too heavy for existing control measures Ships have had to anchor in parts of the harbour which they would ordinarily avoid, and their crews have thus been exposed to fresh sources of malarial infection—a danger only realised gradually because symptoms do not develop until the ships have left port The Ministry of War Transport has arranged for ships masters to warn travellers of malaria risks and to distribute leaflets among them Crews are not allowed to land at night and are told to take suppressive quinine before and after arriving at Freetown. Steps have been taken to prevent anopheline mosquitoes from being carried out from shore on lighters and other craft Reports on the personnel of ships arriving in Great Britain from West Coast ports are being forwarded to Freetown through the Colonial Office so that the authorities there have a check on the number of cases arising in ships leaving the port Since many of the ships going to West Coast ports were not designed for use in the tropics it is difficult to make them mosquito proof but insecticides have been used freely and welfare committees have been established in the ports to look after the needs of merchant seamen

An investigation lasting a year has been carried out by Prof D B Blacklock of Liverpool University, and Dr Carmichael Wilson of the Colonial Medical Service. They have recommended control measures which the Service authorities are helping to carry out Native houses are being sprayed with insecticides and a campaign to improve sanitary control in towns and villages is going on A long term plan in the hands of an experienced irrigation engineer aims at systematic drainage of the region The habits of mosquitoes breeding in the mangrove swamps round Freetown are being studied by Dr Muirhead Thomson they favour a special type of mangrove—the avicennia—which only grows in limited areas and can probably be eliminated The RAF have taken aerial photographs of the swamps in which the avicennia orchards can be picked out

ORDER OF ST JOHN

BOTH in this war and the last the British Red Cross Society and the Order of St John of Jerusalem have found it convenient to work together for the sick and wounded and this effective war time cooperation suggested the possibility of a permanent union The united body would, however, have to comply with the rules applicable to all national red cross societies in order to obtain international recognition and the order has decided with regret that they cannot reconcile their charter and constitution with these rules Though the idea of union has therefore been abandoned, a committee of representatives of both bodies is considering how they may continue to cooperate in their work

The report of the chapter general of the order for 1942 shows that over 145 000 certificates for first aid home nursing, hygiene, sanitation and cookery were awarded—slightly fewer than last year Well over 10 000 classes were examined and although there were difficulties caused by war time restriction the association has never failed to find a medical lecturer or examiner for a class, and the committee remains strongly opposed to the proposal to introduce some form of lay instruction

"CLEANSE THE LEPER"

IN a sermon to members of Oxford University, now reprinted (Oxfd Univ Press, 6*d*), the Kings chaplain remarked that although the Founder of Christianity laid on his disciples as a primary duty the cleansing of lepers millions of Christians today had not even thought of leprosy relief Mr Clayton said he had not heard one sermon on the leprosy crusade, nothing was taught at school nothing at Oxford he had travelled twice round the world himself before he came in touch with leprosy Since then he had visited 32 leper colonies, and he gave an account of the treatment of leprosy before and after the introduction of the hydnocarpus by Leonard Rogers and Ernest Muir Chaulmoogra trees will grow, he said, in every place where leprosy abounds and if his hearers in Oxford should decide after the war to fight leprosy, it could be brought under control before 2000 AD—and the search for ' leper window become a pastime for architectural connoisseurs Examples draw when precept fails, and sermons are less read than tales —but this sermon is a very good tale

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Royal Faculty of Physicians and Surgeons of Glasgow

At a meeting of the faculty held on Monday Sept 6 with Mr James H MacDonald, the president in the chair, the following were admitted to the fellowship Cuthbert Blundell Anscow, Gartcosh Andrew Kerr Boyle Drymen Jankinath Manhas Walsall, Vernon Turner Smith Manchester, qua physician and Charles Workman Maclay Glasgow, qua surgeon

Course on Industrial Health

A week end course for doctors on factory medical services and industrial diseases will be held at the London School of Hygiene Keppel Street W C 1 Dr E R A Merewether senior medical inspector of factories will open the course at 2 PM on Saturday Oct 2 and afterwards Dr Donald Hunter will speak on the clinical approach to industrial medicine and Dr E L Middleton on the occupational pneumoconioses On the following day at 10 15 AM Dr D T Davies will lecture on anæmia in war time, and other speakers will include Mr L J Harris D SC on nutrition and vitamins in war time Dr Sibyl Horner on the prevention of industrial dermatitis and Mr H E Griffiths on rehabilitation with special reference to minor injuries Further information may be had from the secretary of the school

Grants for Pupil Midwives

To encourage the recruitment of midwives the Minister of Health has decided to continue to pay grants to recognised training institutions at the rates which have been in force since December, 1940 Grants are payable for pupils in part I training schools who enter for the second period of training or declare in writing their intention to become health visitors and for all pupils in part II training schools It will be a condition of the grant that the recommendations of the Midwives Salaries Committee including specific salaries for pupil midwives as well as for certified midwives have been adopted by the institution

Association of Scientific Workers

The London area committee of the association is holding a conference at the Essex Hall Essex Street W C 2 on Saturday Oct 2 at 2 30 PM on the problems of freed Europe and the challenge they will offer to the medical sciences Prof J R Marrack will describe the relief plans which have already been made by the Allied Governments, and representatives from occupied territories will suggest the medical aid and food supplies which will be needed when their countries are freed Mr Aleck Bourne and Mr F Le Gros Clark will also speak and Dr Douglas McClean will be in the chair

NAPT Refresher Course

The committee on education in tuberculosis of the NAPT and the Joint Tuberculosis Council have arranged to hold the second of their series of refresher courses from Oct 11 to 16 at the London School of Hygiene, Keppel Street W C 1 The course is intended to give a concentrated review of the medical and social aspects of the disease for tuberculosis officers and practitioners Further information may be had from Dr Harley Williams, Tavistock House North W C 1

We regret to record that Sir WILLIAM WHEELER, consulting surgeon to the Royal Navy in Scotland and past president of the Royal College of Surgeons in Ireland, died in Aberdeen on Sept. 11 at the age of 64.

Dr. H. E. A. BOLDERO, registrar of the Royal College of Physicians of London, is taking Lord Moran's place, during his absence, on the Oliver committee inquiring into detention barracks.

Frustration and Fulfilment

A series of lectures on the psychology of frustration and fulfilment will be given under the auspices of the provisional National Council for Mental Health during the autumn, on Tuesdays and Wednesdays at 5.15 PM, at the Caxton Hall, S.W.1. On Oct. 5, 12, 20 and 27, Miss Anna Freud will speak on instinct fulfilment and frustration in education; on Nov. 3, 9, 16, and 23 Miss E. N. Rooker, late principal of Dr. Barnado's staff training school, on practical application in childhood; on Nov. 30, Dec. 7, 14 and 21, Prof. John Macmurray on social sources of frustration and fulfilment. Tickets for the course may be had from the lecture secretary of the council, 39, Queen Anne Street, London, W.1.

Chadwick Lectures

During the autumn the following Chadwick lectures have been arranged: at 2.30 PM, on Oct. 5 at 26, Portland Place, W.1, Dr. E. J. Boome on muscular and mental relaxation in peace and war; at 2.30 PM on Oct. 26, at the London School of Hygiene, Keppel Street, W.C.1, Miss Margery Fry, LLD, ill health and ill doing; at 2.30 PM on Nov. 11 at 90, Buckingham Palace Road, S.W.1, Mr. J. H. Forshaw, FRIBA, town planning and health; at 4.30 PM, on Nov. 23, at St. Mary's Hospital medical school, Paddington, W.2, Sir Harold Morris on Sir Malcolm Morris, dermatologist—some personal reminiscences; at 2.30 PM on Dec. 14, at 26, Portland Place, W.1, Air-Commodore P. C. Livingston on the maintenance of visual efficiency in the Royal Air Force. Further information may be had from the secretary of the trust, 204, Abbey House, Westminster, S.W.1.

Royal Medical Foundation of Epsom College

The conjoint committee of the College will in November award an annuity of £35 per annum to a spinster daughter of a medical man. Candidates must be Protestants and fully 65 years of age. They will also award in December a "France" pension of at least £30 per annum to a necessitous medical man, fully 55 years of age, who has been registered for 5 years. Forms of application may be had from the secretary's office, Epsom College, Surrey, and must be returned by the morning of Oct. 25.

Royal Sanitary Institute

A meeting will be held at Rhyl on Saturday, Sept. 25, when Dr. A. E. Roberts, MOH for Flintshire, will discuss the Government milk policy, and Mr. M. Emlyn Thomas, sanitary inspector for Hawarden RD, will read a paper on Milk Administration: Past, Future?

Medical Casualties

The following RAMC officers have been posted as prisoners of war: Lieut.-Colonel St. C. E. J. Barrett, MRCS; Captain A. W. Chester, MD DURH.; Captain H. W. Cowen, MRCS; Lieutenant E. J. Emery, MB GLASG.; Major Hugh Henderson, LRCPE; Captain C. V. Lewis, MB LOND.; Major A. T. H. Marsden, MD DURH.; Lieut.-Colonel D. S. Middleton, FRCSE; Captain J. R. Roulston, MB BELF.; and Captain K. W. Todd, MRCS.

Queen Alexandra Sanatorium Fund

During the season 1942–43 the fund has maintained 8 adults, 4 at the Kurhaus, Clavadel, 3 in other parts of the Davos valley, 1 at a lower altitude, near Zurich. As a whole they are making slow progress. Of 8 children maintained by the fund, 7 are at the British Children's Home in Davos-Dorf, 1 is apprenticed to a cabinet maker at Zurich. A second boy apprenticed to a Zurich metal worker is now maintained by the Birmingham Children's Hospital. A girl who has been in Davos since 1937 is due for transfer to an English boarding school when it is possible for her to travel. All the children are making good progress and are probably well enough to return; 3 did manage to get home before the complete occupation of France. At the children's home an extra frs.10 a week is being paid towards the increased cost of living, but even this does not cover the cost and Mrs. Cable, wife of the British Consul at Zürich, has been contributing as chairman of an English Women's Association in Switzerland.

Awards to IAMC Officers

As announced in our issue of Aug. 28 the MC has been awarded to Captain Narayana Subramaniam and Captain Christopher Arumainayagam.

Captain Subramaniam showed [illegible] to duty during the Djebel Garci [illegible] only skilfully dressed under shell [illegible] to the regimental aid [illegible] out into the shell-swept zone to atten[illegible] and other units [illegible] his MB from the [illegible] April in the Enfidaville sector, although on more than one occasion knocked down by blast from bursting shells, Captain Arumainayagam continually moved about over a wide shell-swept area tending the wounded. "Knowledge of his presence," states the citation, "had a definite effect on the morale of the battalion." Captain [illegible] Madrassi from Vepery. He graduated from [illegible] College in 1939, and was assistant medical off[illegible]ospital, Chittoor district, before joining the army in 1941.

Association of Industrial Medical Officers

The annual general meeting will be held at 11 AM on Saturday, Oct. 16. In the afternoon Dr. M. W. Goldblatt will read a paper on the investigation of toxic hazards.

Royal Institute of Public Health and Hygiene

On Wednesdays from Oct. 13 to Nov. 17 at 3.30 PM a series of lectures on national health will be given at the institute, 28, Portland Place, London, W.1. On Oct. 13, Dr. J. Browning Alexander will speak on the catarrhal child; Oct 20, Mr. Lionel Colledge on deafness and hardness of hearing; Oct. 27, Wing-Commander R. R. Trail, on the new approach to the diagnosis of pulmonary tuberculosis; Nov. 3, Dr. Robert Klaber on dermatology and the public health; Nov. 10, Dr. Matthew Ray on osteo-arthritis; and on Nov. 17, Colonel Henry Yellowlees on mental strain in war-time.

Appointments

CRAIG, J. W., MB ABERD.: examining factory surgeon for Aberdeen.
MILLS, N. L., MA CAMB., MRCS: MO in Tanganyika Territory.

Births, Marriages and Deaths

BIRTHS

BODY.—On Sept. 5, at Caterham, the wife of Captain R. B. Body, RAMC—a daughter.

DANIEL.—On Sept. 2, at Oxford, the wife of Dr. Peter Daniel—a daughter.

KENDALL.—On Sept. 4, in London, the wife of Dr. John Kendall—a daughter.

MILLER.—On Sept. 4, at Longbenton, Newcastle-on-Tyne, Dr. Sheila Miller (*née* Franklin), wife of Captain F. J. W. Miller, MRCP, RAMC—a daughter.

MURCHISON.—On Sept. 4, at Sherborne, the wife of Surgeon Lieut.-Commander E. H. Murchison, RN—a daughter.

SPRATT.—On Sept. 9, at Guildford, the wife of Lieutenant Leslie Spratt, RAMC—twin daughters.

SWAYNE.—On Sept. 4, at Hitchin, the wife of Captain Deneys Swayne, RAMC—a daughter.

WATERLOW.—On Sept. 9, at Marlborough, the wife of Dr. J. C. Waterlow—a son.

MARRIAGES

DOBBIN—BAILEY.—On Sept. 4, in London, Clarence John Valentine Dobbin, MRCS, to Betty Irvin Bailey.

GRAHAM-HODGSON—HALLAM.—On Sept. 11, Harold Kingston Graham-Hodgson, CVO, FRCP, of London, to Rosa Dorothy Hallam.

DEATHS

BAYNES.—On Sept. 6, Helton Godwin Baynes, MB CAMB, of West Byfleet, Surrey.

BROWN.—On Sept. 10, at Shoreham-by-Sea, Reginald Brown, MRCS, aged 75.

GARDNER.—On Sept. 7, Harold Bellamy Gardner, MRCS, of Clarence Gate Gardens, N.W.1, aged 74.

LOVEGROVE.—On Sept. 7, at Hexham, Northumberland, Arthur Charles Adams Lovegrove, MD DURH., late of Settle, Yorkshire, aged 80.

MARSH.—On Sept. 12, at Bridgnorth, Shropshire, Frank Marsh, CBE, CH M BIRM., FRCS, DPH, DL, sometime surgeon and lecturer on clinical surgery, Queen's Hospital, Birmingham, aged 88.

SCOTT.—On Sept. 7, at Inchbrook, near Stroud, Arnold Scott, MD LOND. late of Bocking.

SMELLIE.—On Sept. 12, at Poole, John Clementson Smellie, MB LOND, formerly of Westcliff-on-Sea.

WHEELER.—On Sept. 11, in Aberdeen, Sir William Ireland de Courcy Wheeler, FRCSI, surgeon rear-admiral, aged 64.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.

LIMB COMPRESSION
IN THE TUBE SHELTER DISASTER

E G L Bywaters, M B LOND, M R C P
BEIT MEMORIAL RESEARCH FELLOW, ASSISTANT IN THE DEPARTMENT OF MEDICINE, BRITISH POSTGRADUATE MEDICAL SCHOOL

With a note on Plasma Volume Determinations

A C Crooke
M D CAMB

C J O R Morris
PH D, M SC LOND

DEPARTMENT OF MEDICINE, A LONDON HOSPITAL

Among the 60 injured survivors of the shelter disaster on March 3, 1943, in which over 200 people were tightly packed for 1½–2 hours, 12 cases were seen showing signs of muscle damage similar to those of the crush syndrome The cases were of all degrees of severity, ranging from case 1 who died of injuries other than those to muscle within an hour of release, and case 2 who developed severe uræmia, to patients whose injuries were skin deep only. While only the more severe injuries were of clinical importance, the slighter cases, which by themselves could not be said to have been suffering from "crush syndrome," illustrated the response to a milder degree of the same injury, there may have been others of this mild type which escaped notice It was not possible to follow all of these 12 cases thoroughly, but some observations of value to the problem of crush injury have emerged

CASE 1

Male, aged 18, admitted to hospital at 11 05 P.M., 2½ hours after he was trapped He was conscious on arrival and "shocked"—cold, shivering, with a weak pulse and shallow respirations Muscles of the thigh and arm were swollen but hard and firm Within 45 min of admission he was found in a "fit," vomiting and unconscious, with gasping respiration He was still very cold, with a weak and rapid pulse, and died in a few minutes

Autopsy (Dr Keith Simpson)—Strong physique, no disease bearing on cause of death Particularly heavy and sustained pinning pressure evident across left side of trunk, heaviest across left thigh Heavy clothing pressure marks extended from left mid chest across left abdomen to left forearm and upper leg, deep asphyxial congestion with many petechial hæmorrhages over head and neck (gross bleeding from right ear and shoulder) Direct pressure abrasions present on left brow and right upper and lower lips, the latter crushed and bleeding slightly

Evidence of the weight of pressure on the left trunk was given principally by the stomach and intestines, which had already developed traumatic paralytic dilatations Stomach measured 10 × 5½ in and contained only 2–3 oz of fluid and gas No bony injury was present, but there were gross asphyxial changes with intrapulmonary, myocardial, skin and cerebral hæmorrhages Remarkable ischæmic necroses of muscle were present in both thigh flexor groups They were clearly pressure necroses and identical with those seen in persons pinned down by beams and debris in air raids, and regarded as the basis for myohæmoglobinuria and subsequent suppression of urine He must have remained alive while pinned down and for a time after release for this condition to appear in the muscle It is unlikely that sufficient time elapsed for renal changes to appear In view of the other findings this condition could have no bearing on the cause of death, which was pulmonary and cerebral hæmorrhage due to asphyxia (from suffocation).

Histological examination showed in the muscle some slight [illegible] ange, [illegible] The [illegible] capsule, which contained eosinophil granular material, the first portion of the proximal convoluted tubule pouted into the capsule The capillaries were congested

It may be concluded from this case that muscle degeneration may follow compression for two hours without any violent "crush" [illegible] masonry fall during a[illegible] for an hour after rele[illegible] out into the muscl[illegible] present, for gross or histological renal damage to be seen

CASE 2

Female, aged 16, admitted to a local hospital after her release (March 3), and transferred to another hospital next day, had been pinned down at the bottom of the steps for 2–3 hours with only her face and right arm free Before her transfer it was noted that the left calf and right buttock were swollen and tender On the day after injury she was incontinent and vomiting, there were some abrasions and discoloration with swelling of the left thigh and lower part of both legs Pulsation was felt in the posterior tibial and popliteal arteries Reflexes normal On the 2nd day the urine was acid and dark brown or black ('navy blue by reflected light') but without sediment On the 3rd day the urine was less dark (smoky) but only became quite clear of blood by the 7th day, it was never red She continued to vomit small quantities of bile stained fluid, but despite occasional sl[illegible] [illegible]astric pain there [illegible] slung" and no [illegible] On March 16 [illegible] 108 oz and the [illegible] output 65 oz, [illegible] given in table I

Examination on March 18 showed a girl with rather thick speech due to a swollen, dry and rather raw tongue covered with brown fur A systolic murmur was heard at the apex, apex beat 10 cm from midline Fundi normal, chest normal, no enlarged glands Abdomen soft, no erythema BP 130/65 mm Hg The left arm showed some fading erythematous patches, these were also noticeable over the front of the lower parts of both legs and the front of the left thigh There was slight residual swelling of the left thigh (circumference 47 5 cm at 20 cm and 38 7 cm at 10 cm above the top of the patella, compared with 45 5 and 37 cm in the normal right thigh This was more apparent to the eye, because of flabbiness of the skin on the left, 15 cm. below the top of the patella the calves measured 27 [illegible] (right) and 28 5 (left) [illegible] re was some œdema [illegible] eries were pulsating [illegible] of position Power, [illegible] feet, plantar flexion was very weak and extension was lost The left knee-jerk was weak compared with the right, and the right ankle jerk weaker than the left The Van Slyke standard urea clearance was 23% of normal by the 21st day "Protein" finally disappeared from the urine by the 22nd day, and vomiting ceased by the 29th day She was discharged on April 11 with a normal blood urea

TABLE I—BLOOD AND URINE ANALYSIS * IN CASE 2

Date	Days after accident	Blood (per 100 ml)			Urine (per 100 c.cm)	
		Hb (g)	Urea (mg)	CO_2cp ‡ (ml)	Urea (g)	Protein (mg)
March 17	14	9 5	380	56	0 07	30
18 †	15	9 2	248	54	1 10	30
„ 21	18				1 18	30
22	19				12 8	40
„ 29	26		120			
April 9	37		20			

* Methods as listed in Bywaters and Popjak (1942)
† Serum potassium 19 mg, serum phosphate 15 3 mg, serum chloride 560 mg per 100 c cm
‡ Carbon dioxide combining power

This patient was already recovering by the time it was possible to make a detailed examination No special treatment had been instituted other than rest in bed and good nursing There had been severe uræmia, and renal function was still poor, though the urinary area concentration was recovering at a rate of 50–100 mg per 100 c cm per day There was also a residual anæmia which is often a feature of crush syndrome

CASE 3

[illegible] 1 25 P.M., 3 hours aft[illegible] compressed and ve[illegible] estimate, but more probably 2–2½ hours She had passed urine last at 7 30 P.M., an hour before the accident Neither on admission nor subsequently did she appear to be shocked

Examination at 3 30 A.M. on March 4 (19 hours after she was trapped) showed a pale young woman with a left subconjunctival hæmorrhage She had vomited 9 oz in the past few hours

Temperature 97° F. pulse-rate 90–100, respirations 28 per min., BP 120/90 mm. Hg. The left leg showed only a few erythematous patches on the shin and over the dorsum of the foot. The right leg, however, was more severely damaged: there was a large erythematous patch, 6 in. × 8 in., on the inner side of the upper thigh, a similar one on the anterior and outer side of the lower thigh, and smaller patches on the lateral and medial anterior surfaces of the shin. No objective sensory loss could be found, but a patchy numbness was complained of over the lower legs. The upper part of the thigh was a little swollen (see table II) and painful: there was a well-marked swelling and doughy feeling (without pitting) of the lateral quadriceps above the knee, of the whole of the peroneal extensor compartment, which was very hard and of part of the gastrocnemius. Pulsation could not be felt in the posterior tibial artery, and it was diminished compared with the uninjured side in the anterior tibial artery; but the toes were warm. She could not extend her toes at all; weak plantar flexion was just possible. Urine passed at 7.15 AM and 12.30 PM was acid (pH 5·5), dark brown, and spectroscopically showed well-marked bands of myohæmoglobin (at 581 mμ) and metmyohæmoglobin (636 mμ) (see fig. 1); no casts were seen; a white deposit consisted of amorphous granules; no reducing substances were present. Sodium bicarbonate, 8 g. by mouth, was vomited immediately, and therefore an intravenous infusion of a litre of M/6 (isotonic) sodium lactate (containing 18·7 g.) was started at 5.30 PM. By 6.25 PM the pH had risen to 5·8 and thereafter hourly urine collection (indwelling catheter) showed the pH rising to 6·7, 7·5 and 8·0. Many casts, mainly of the stringy variety, were seen in the 7.25 PM specimen. By 10 PM another litre of lactate was started, given with equal quantities of 5% glucose in one-fifth normal saline. A total quantity of 2·15 litres M/6 lactate and 650 ml. 5% glucose saline was given over 44 hours, at the end of which (1.15 PM on March 6) the urine was nearly clear, except for red blood-cells due to the indwelling catheter, so the drip was discontinued. Biochemical findings are shown in tables III and IV.

TABLE II (CASE 3)—CIRCUMFERENCE OF LEGS IN INCHES

Site: Top patella		March 4 3.30 PM	March 5 10 AM	March 6 noon	March 8 2 PM	March 12 4 PM
8 in. above	R.	18	17½	17¾	19¾	17
	L.	17½	16½	16	15½	15¼
4 in. above	R.	15½	15½	15½	16¾	14¾
	L.	14½	14¼	14	13¼	13
6 in. below	R.	12¼	12	12¼	12	..
	L.	12¼	11¼	11½	11¼	..

During the first night the patient complained of pain in the right upper thigh, and of some abdominal pain. The abdomen showed no rigidity or tenderness; peristaltic movements were heard. She vomited 1 oz. at 3 AM. On March 5 her condition was about the same; pulsation was now adequate at the ankle; BP 110/75 mm. Hg. On March 6 her temperature rose to 99° F, respirations 20 per min., BP 130/90 mm. Hg; the right leg still showed traces of erythema and was swollen as before, but the swelling was not so hard. There was still no power to extend the right foot, and flexion was weak in both feet particularly in the right. A foot splint was applied. She was apathetic and a little drowsy, but her general condition was good. The urine now contained many red cells and some leucocytes due to the indwelling catheter, which was therefore removed. Sulphanilamide was given by mouth. On the 4th day (March 7) her fluid intake by mouth was 114 oz. On the 5th day the right thigh was more swollen, and the lower leg showed pitting œdema; BP 110/65. On the 8th day biopsy was performed on the upper portion of the right peroneus muscle; this appeared normal microscopically. The patient was now rapidly recovering: the BP was 110/75 mm. Hg, and the right leg was much less swollen. Exercises were instituted.

It may be calculated from table IV that this patient (weight 40 kg.) excreted 6·6 g. of myohæmoglobin: we have found normal human muscle to contain about 5 g. per kg., so this corresponds to a minimum amount of muscle damaged equal to 1·3 kg—i.e., 32 c.cm. per kg. body-weight. (This is a minimum figure only, because we have found that totally necrotic muscle in man may have lost only 50–75% of its myohæmoglobin.) This amount of damage (30 c.cm. per kg. body-weight) in the using a rubber band compression for 3 hours or more, will produce severe shock with limb swelling, fall in BP, and hæmoconcentration of 20–30% (Bywaters and Popjak 1942). This means a decrease in plasma volume of 28–38%. It can be calculated from the data appended on plasma volumes that this patient showed a decrease in plasma volume of 24%, or 480 c.cm., assuming her normal plasma volume to be 5% of body-weight. Table III shows that she had a hæmoconcentration (if the later hæmoglobin figures be taken as her normal level) of + 26%, corresponding to a calculated decrease in plasma volume of 33%—that is, a decrease of 670 c.cm. from a theoretical normal plasma volume (= 5% of body-weight) of 2·03 litres. According to circumference measurements, the volume of the right thigh was about 520 c.cm. greater than that of the left. But despite the fall in blood volume, which can be calculated from the dye measurements, the hæmoglobin fall and the increase in leg volume, her BP did not fall; she was in the first stage of "shock" where decrease in blood volume is adequately compensated by increased vasoconstriction. The blood became diluted rapidly, but, since the plasma-protein-concentration fell, the diluting fluid contained less protein than the serum which was lost locally.

Substances other than myohæmoglobin lost from damaged muscle include creatine, potassium, phosphorus and acid substances. No analysis for phosphorus was made. Table IV and fig. 1 show that the other substances were excreted in increased amounts in the urine, especially in the first specimen and in those passed after intravenous therapy was begun. However, the extra amounts excreted during the first two days after release (the normal being gauged by excretion on an ordinary diet on the two succeeding days) exceed the amounts expected from the quantity of muscle damaged (calculated from the pigment loss). In crush injury the necrotic muscle may lose 65–70% of its creatine and 50–90% of its potassium (Bywaters and Stead 1943). If we assume that 70% of each of these substances was lost from the damaged muscle, the amount excreted corresponding to 6 g. pigment should be creatine 2 g. and potassium 6 g.; whereas the amount of these substances excreted during the first 60 hours, over and above the basic rate of loss calculated from the succeeding 46 hours' output on a normal diet, was creatine 3 g. and potassium 10 g. It seems either that pigment is retained in the body or that extra quantities of potassium and creatine are excreted. The latter hypothesis would fit in with the findings of Cuthbertson and others (1939)—after fracture of the femur in rats, a greater nitrogen and potassium output occurred than was thought could be derived from the local tissue injury.

Note that in this case the extra urea and creatinine output (over and above the output in the third period from 62 to 100 hours after release) was greatest in the second 24 hours, whereas the excretion of potassium and creatine was greatest in the first 24. As the urine became less acid (due to treatment), the proportion of insoluble pigment became less: in the later specimens above pH 8·0 all the pigment was in solution. At no time was impairment of excretory function noted: no casts were seen in the first two specimens, and only stringy, tailed casts were washed out as a result of the diuresis in the third specimen. Within 36 hours the excretion of pigment had ceased, but some protein was still being put out; little can be said on this point, as the patient had by then a mild catheter cystitis. The urine, at first acid (pH 5·5), became neutral about 2 hours after the intravenous infusion of sodium lactate, and alkaline an hour later. The CO_2-combining power of the plasma also rose promptly in the 2 hours from 40 to 50 vols. %. The influence of this alkalinisation on the clinical course will be discussed later in relation to the other cases. It will be noted that this patient showed no rise in blood-urea or plasma bilirubin.

CASE 4

Female, aged 20, admitted to hospital at 11.10 PM, 2¾ hours after being pinned down by both legs, which were painful but soon became numb. The patient was not shocked on admission or afterwards. She had passed urine last before the accident at 7 PM.

Examination at 4.15 PM showed a very fat girl with slight erythema over the lower part of the right peroneal muscles and the middle part of the left tibia. The left gastrocnemius was slightly swollen. There was no weakness of the muscles, [illegible] the dorsum of the right foot. [illegible] below the top of the patella [illegible] The buttocks were rather red and sore. BP 120/95 mm. Hg. T 99° F, P 88 per min.; R 20 per min. Urine passed at 7 05 AM and 12.30 PM on the day of admission was highly acid (pH 5 4 and 5 5) and contained no reducing substances; the later specimen showed a brown deposit containing acid hæmatin in the form of pigmented granular casts, and the supernatant fluid showed faintly the spectrum of myohæmoglobin and the met compound. Within an hour of her receiving 8 grammes of sodium bicarbonate by mouth the urinary pH was 6·2 and 2½ hours later (with 8 g. sod. bicarb. hourly) it had risen to 8 5. Thereafter the urine was alkaline, free from pigment and adequate in quantity (fig. 2). Biochemical findings are given [illegible] 5) the BP was [illegible] and showed no [illegible] from the urine. On the third day, BP 115/75 the [illegible]

[illegible] circumference as compared with 13 in. on the left); BP 130/90. On the eighth day (BP 130/85) slight residual pitting over the right ankle only was found. Recovery followed.

The lesser severity of this patient's injuries compared with the previous one are reflect[illegible] in the smaller amount of creat[illegible] excreted (250 mg. and 1·1 g. [illegible]), and in the smaller hæmoconcentration (+ 13%, if the last figure is taken as her normal Hb. level). This means a decrease in plasma volume of 20%. The figure for the plasma volume obtained by Crooke and Morris (2·11 litres), if her normal plasma volume is reckoned to be 2 9 litres (5% of body-weight), corresponds to a decrease in plasma volume of 27%. This last figure may be rather high, since the patient was obese. There are three further interesting points in this case. The first urine was said to be normal in colour, the second [illegible] the deposit, and it [illegible] urine that pigmented [illegible] the deposit and the spectral bands of myohæmoglobin were seen in the supernatant fluid. The second point of interest is the rapidity with which protein disappeared entirely from the urine (within 24 hours). The clinical signs of crush injury were extremely slight—skin erythema and a scarcely noticeable swelling associated with complete absence of objective sensory loss and of weakness by clinical testing —yet the [illegible] s patient undoubtedl[illegible] as a true case of " [illegible] obesity prevented [illegible] l, but it probably he [illegible] had.

CASE 5

Male, aged 50, admitted to hospital at 11.30 PM, had been pinned down since 8 30 PM by both legs, which were very painful at first, the right more so than the left. Later, after about 2 hours, they became numb. He was extricated between 10.30 and 11 PM, and, after spending about a quarter of an hour in a rest cubicle, was sent into hospital. He last passed urine, before the accident, at 5 PM. Neither on admission to hospital nor subsequently did he appear to be shocked.

Examination at 5 PM on March 4 showed a drowsy man, in good general condition, BP 110/85 mm. Hg, T 99 4° F, with a severe abrasion over the point of the left elbow. The main lesion was confined to the extensor muscles of both lower legs. These were swollen and extremely hard, but with no pitting; the skin over them and over the tibial subcutaneous surface was erythematous and warm. The circumference 8 in. below the top of the patella was 14 in. (right) and 13½ in. (left). There was no sensory loss to light touch or pinprick, but a slight numbness was complained of over the dorsum of both feet and the anterior aspect of the ankle. The pulsation in both feet and in the right anterior and posterior tibial arteries was normal and the feet warm. Both extension and flexion of the toes and feet were best on the right side, and although power to flex the left foot was not grossly impaired, extension on that side was extremely poor. The urine, which he had been passing in quantity since admission, contained a brown-red deposit consisting of pigmented (acid hæmatin) casts, and was very acid (pH 5 3; see table IV). The supernatant urine was brown, containing met myohæmoglobin. The urine reaction rapidly approached neutral after sodium bicarbonate was given by mouth (8 g. hourly in milk for four doses = 32 g.). No further pigment was excreted, and the number of casts rapidly diminished. Biochemical findings are given in tables III and IV.

By next morning the swelling [illegible] the affected muscles [illegible]

[illegible] the same over the next (the third) day. T 97 6° F. Fourth day, oral intake 46 oz. On the fifth day (BP 105/80) the swelling of the right leg was slightly less (13½ in). On the eighth day (BP 100/65) the measurements of the legs were 12½ in. (right) and 12 in. (left). The patient began to get up.

Although several urine specimens were discarded before they could be examined, enough was saved to estimate that this man lost a minimum of 2 g. of pigment, corresponding to a muscle volume of 400 c.cm. The creatine loss was also extensive (about 1 g. minimum) lasting over the first 30 hours; after 48 hours, however, the urine contained neither protein nor casts. The blood showed a hæmoconcentration of + 21% (corresponding to a decrease in plasma volume of 1 litre from an estimated normal of 3·3 litres), whereas the dye method of Crooke and Morris showed a plasma volume of 3 litres, more nearly approaching the theoretical normal for his weight.

CASE 6

Female, aged 50, admitted to hospital at 11.45 PM, had been pinned down since 8 30 PM by both legs, which were crossed. They were both very painful up as far as the knee for the first hour, but after this went numb. She vomited several times. She had last passed urine at 8 PM, ½ hour before the accident. Neither on admission nor at any subsequent time did she appear shocked.

Examination at 4 PM next day showed neither swelling nor erythema above the knee, but patches of erythema were seen on the right inner femoral condyle, over the lower and outer part of the right leg above the ankle, on the dorsum of the right foot, and on the outer and inner sides of the left leg above the ankles: in the last position there was scabbing. The circumference of the legs 8 in. below the upper border of the patella was 10¾ in. (right) and 10½ in. (left). There was a well-marked swelling and doughy feeling without pitting œdema of the lower part of the right peroneal and extensor muscles, and the dorsum of both feet showed pitting œdema. Pulsation in anterior and posterior tibial arteries was good, there was no objective loss of sensation, although numbness and pins and needles were complained of as far as half way up both legs. There was perhaps very slight impairment of toe extension BP 105/80. Urine passed at 7 AM and 12.30 PM on the first day was highly acid (pH 5 2) and showed a brown pigment deposit consisting of acid hæmatin, microscopically seen as pigmented granular casts The supernatant urine was

TABLE III—BLOOD ANALYSIS (PER 100 ML.) IN CASES 3–7

Date and time	Hb. (g.)	CO$_2$cp (ml.)	Urea (mg.)	Bili-rubin (mg.)	Protein (g.)	Daily fluid intake by mouth (oz.)
CASE 3						
Mar. 4 5 PM	16·4	40·4	..	.		
„ 7.45 PM		50	..	..	7·7	36
„ 5 11.30 AM	12·8	53·8	38	.	7·2	81
„ 6 11 30 AM	13·0	53·8	25	1·1	7·3	97
CASE 4						
Mar. 4 5 PM	13·9	43·3	..	..	7·4	
„ 7.45 PM	13·6	60	31	..		109
„ 5 10 AM	12·0	78·6	25	1·0	7·0	100
„ 6 11 30 AM	12·3	68·1	26	0·8	7·2	71
CASE 5						
Mar. 4 6 40 PM	16·0	55·7	.	..	7·4	55
„ 5 1 PM	13·2	74·8	38	1·1	6·6	86
„ 6 noon	12·9	62·4	38	1·2	6·7	92
CASE 6						
Mar. 4 5 PM	14·6	39·5	.	.	7·2	59
„ 5 10 30 AM	13·4	64·3	31	0·9	7·2	113
„ 6 11.30 AM	13·5	61·4	20	1·0	7·7	131
CASE 7						
Mar. 5 10 30 AM	12·0	78·6	26	1·0	..	

TABLE IV—URINE FINDINGS IN CASES 3–7

Date and time	ml./hr	pH	Protein	Urea	Creatine	Creatinine	Potassium	Pigment: Total	Pigment: Supernatant	Spectroscopic	Microscopic
			mg. per 100 c.cm.								
CASE 3											
Mar. 3–4, 7.30–12.30 PM	67	5·5	550	1120	211	100	455	271	258	MyoHb., faint met-myoHb.	Amorphous granules
,, 4 12.30–6.25 PM	40	5·8	600	2200	45	100	314	358	327	,,	,, ,,
,, ,, 6.25–7.25 PM	240	6·7	500	2000	46	69	440	241	237	MyoHb.	Granular and stringy casts
,, ,, 7.25–8.25 PM	240	7·5	250	1270	10	47	330	176	164	,,	Cast debris and ep. cell casts
,, ,, 8.25–9.25 PM	120	8·0	250	1170	19	38	320	162	162	,,	Rare casts
,, ,, 9.25–10.25 PM	120	8·0	200	1140	23	41	280	155	153	,,	,,
,, 4–5 10.25 PM–10 AM	94	7·1	150	1220	32	53	204	105	104	,,	Nil
,, 5 10–11.15 AM	290	6·8	60	880	17	28	60	35	35	Nil	,,
,, 5–6 11.15 AM–9.15 AM	150	7·1	200	770	12	13	100	0	0	HbO_2	Many red cells
,, 6–7 9.15 AM–9.05 AM	91	7·2	90	790	12	31	65	0	0	,,	,,
,, 7–8 9.05 AM–7 AM	82	7·2	80	870	13	17	69	0	0	,,	,,
CASE 4											
Mar. 3–4 7 PM–2 AM	51	L	L	L	L	L	..	L	L	L	L
,, 4 2–7.05 AM	72	5·4	50	2000	27	118	..	0	..	..	Many hyaline and gran. non-pigm. casts
,, 7.05 AM–12.30 PM	110	5·5	120	1860	20	100	..	182	149	V. ft. MyoHb. V. ft. met-MyoHb.	Many short pigm. casts and cast debris
,, ,, 12.30–5.55 PM	86	6·2	30	1020	6	81	..	0	..	..	Squames and gran. cast debris
,, ,, 5.55–8.35 PM	133	8 5	20	730	0	53	..	0	..	..	Squames and cast debris
,, 4–5 8.35 PM–7.30 AM	46	7·2	0	1020	0	59	..	0	..	..	Stringy cast debris
,, 5–6 7.30 AM–9 AM	95	7·2	0	600	0	64	..	0	..	..	Nil
,, 6–7 9 AM–7·30 AM	64	7·2	0	590	0	81	..	0	..	..	Nil
CASE 5											
Mar. 3–4 5 PM–5.50 AM	57	5·3	60	2360	114	118	..	277	222	Met-myoHb.	Brown deposit; gran. pigm. and stringy casts
,, 4 5.50–10.50 AM	107	L	L	L	L	L	..	L	L	L	L
,, ,, 10.50 AM–3 PM	36	5·2	40	1180	3	66	..	Trace	0	..	Ditto, 30% stringy
,, ,, 3–6.30 PM	137	6·2	30	1130	9	74	..	Trace	0	..	Many pigm. casts, 70% stringy
,, ,, 6.30–8.45 PM	133	L	L	L	L	L	..	L	L	L	L
,, ,, 8.45–9.30 PM	800	L	L	L	L	L	..	L	L	L	L
,, 4–5 9.30 PM–3 AM	218	7·1	20	830	9	41	..	0	0	..	Rare hyaline stringy casts; no pigm. casts
,, 5 3–11.10 AM	92	7·1	10	830	0	60	..	0	0	..	Rare red cells only
,, 5–6 11.10 AM–1 AM	139	L	L	L	L	L	..	L	L	L	L
,, 6 1–7.40 AM	36	7·2	10	1250	0	120	..	0	0	..	Some hyaline cast debris
,, 6–7 7.40 AM–6 AM	31+	7·1	0	1750	0	109	..	0	0	..	..
,, 7–8 6 AM–10 AM	62	6 5	0	2080	0	111	..	0	0	..	..
CASE 6											
Mar. 3–4 8 AM–7 AM	60	5·2	30	1940	38	92	..	*	..	*	Many pigm. and gran. casts
,, 4 7 AM–12.30 PM		5·2	0	2000	6	79	..	*	..	*	Mod. no. gran. pigm. casts; mod. no. pus cells
,, ,, 12.30 PM–5.40 PM	115	5 6	0	880	3	52	..	..	..	..	Few pus and ep. cells; gran. cast debris
,, ,, 5.40–9 PM	91	8·8	10	730	1	52	..	..	..	..	Few pus cells; debris
,, 4–5 9 PM–8.30 AM	50	7·2	0	830	0	57	..	..	..	..	Rare red cells and gran. casts
,, 5–6 8.30 AM–9.15 AM	105	7·4	0	470	0	45	..	..	..	..	..
,, 6–7 9.15 AM–9 AM	139	7·3	0	680	0	45	..	..	..	..	..
,, 7–8 9 AM–10 AM	117	7·2	0	790	0	57	..	..	..	..	..
CASE 7											
Mar. 4 6 AM	..	5·5	0	2140	49	81	..	0	..	..	Amorphous granules
,, ,, 9 AM	..	7 2	0	2440	8	120	..	0	..	..	..
,, 5 8 AM	..	7·2	0	1360	4	96	..	0	..	..	..
,, 6 8 AM	..	9 3	0	1370	15	59	..	0	..	..	..

L = Lost. * Contained traces of acid hæmatin and met-myohæmoglobin. V. ft. = Very faint.

brown and contained met-myohæmoglobin, but there was too little to estimate quantitatively. No reducing substances were present. Within a few hours of starting sodium bicarbonate by mouth (8 g. hourly), the pH of the urine reached 8·8. The output thereafter was good and no further pigment was excreted. Biochemical findings in tables III and IV. X ray showed nothing besides a doubtful crack in the tip of the outer malleolus. Next morning the erythematous patches were fading, and power was improved. BP 110/75. Some numbness remained over the dorsum of the toes and the outer aspect of the left ankle. Leg circumferences were 10¼ in. (right) and 10¾ in. (left). On the third day her condition was still improving. BP 115/80. Leg circumferences were 10½ in. (right) and 11 in. (left). There was still some pitting œdema of both feet, and deep bruising, more on the left. Some pins and needles in the toes was all that remained of the previous numbness on the right side, although there was an area of numbness (without pins and needles) runnning down the outer side of the left ankle. The temperature, ranging between 98° and 99° F since entry, rose to 101·6° F on the fourth day, probably because of bladder infection from the catheter; sulphanilamide was given. Oral intake, 87 oz. On the fifth day her temperature was again normal, and both legs measured 10½ in. in circumference. BP 125/90. On the eighth day leg circumferences were 10 in. (right) and 10¼ in. (left). There was some pitting œdema on the dorsum of the left foot only. BP 110/80.

Although the clinical signs in this case were more pronounced than in case 4, much less pigment and creatine were excreted, and, with the exception of a slight trace in the fourth specimen, all urines except the first were free from protein. The blood showed a hæmoconcentration of + 8% only, corresponding to a loss of 285 c.cm. of plasma from her total calculated plasma volume of 2·2 litres. The dye method gave a figure for plasma volume only 130 c.cm. below this theoretical normal. Since this patient showed bruising on the third day, with bilirubin 1·2 mg. per 100 c.cm., whole blood loss had occurred, and it is highly probable that the slight fall in hæmoglobin noted over the first 24 hours was partly due to dilution following this blood loss.

CASE 7

Male, aged 11 years, admitted to hospital at 11.10 PM, had been pinned by both legs (? for about 2 hours). He had passed urine at 7.15 PM, before the accident, and twice while jammed in the pile of bodies. He was not shocked and had passed urine six or seven times since admission, none of which specimens were noticed by the nursing staff to be pigmented.

BP 125/70. Small areas of erythema on both shins and on the lateral aspect of the left ankle, where there was slight muscle swelling. Circumference of the legs 6 in. below the top of the patella was 10½ in. (right) and 9¾ in. (left). There was no anæsthesia and no loss of power or pulsation. Urine passed at 6 AM on March 4 was clear, showed no casts, but was acid (pH 5·5). He was given sodium bicarbonate (4 g. hourly by mouth) from 8 PM, and by 9.05 PM the pH had risen to 7·2. Blood analysis in table III. Condition excellent on eighth day. BP 100/55.

This was a very slightly injured patient whose only clinical signs were erythema and slight swelling; the only biochemical sign was the excessive amount of creatine in one of the samples passed on the first day: only a few of these urines were available for examination and none contained protein.

CASE 8

Female, aged 23, admitted to a local hospital at 10.40 PM on March 3, and transferred to another hospital next day, had been pinned by both legs and the left arm, which were at first painful and then numb. No albumin or blood was noticed in the acid urine on the second and third days after injury. The left calf was numb, swollen and painful on admission.

Examination on the 15th day showed a fading erythematous patch on the anterior aspect of the left leg. The peroneal muscles were very soft and flabby compared with the normal right side. Flexion of the toes was weak and extension was entirely lost. BP 125/60 mm. Hg. Urine on the 18th and 19th days contained 2·1 and 2·4% urea and no protein or casts.

CASE 9

Male, aged 30, admitted to a local hospital at 11 PM on March 3, and transferred to another hospital next day, had been pinned by both legs; pins and needles developed, followed by pain and then numbness and swelling. No blood was noticed in the urine; no albumin had been found.

Examination on the 16th day showed fading erythema of both shins. The muscles appeared flabby but there was no apparent swelling. There was some numbness of the second and third toes on the left, and a well-marked extensor paralysis. Biopsy of the affected muscle at 3 weeks showed only a few normal fibres left—some of which were swollen and vacuolated; the rest of the fibres had disappeared, to be replaced by small muscle-fibres regenerated from the sarcolemma (fig. 3). Urine on the 18th and 19th days showed 1·8 and 2·2% urea and no protein or casts. Complete recovery (May 3).

CASE 10

Female, aged 40, admitted to a mission hospital at 10.30 PM, had been pinned by the chest and both legs for about 2 hours. Urine the next morning was clear, sp. gr. 1010, and contained no albumin.

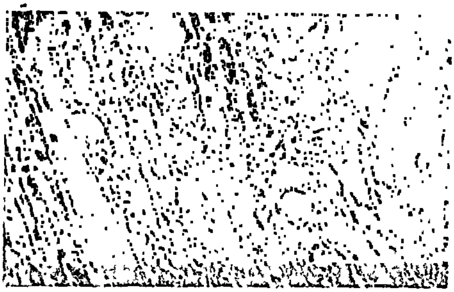

Fig. 3—Case 9.
toxylin and eosi
ration (left) or
The remainder are small new fibres regenerated from sarcolemmal sheaths; black masses of proliferating sarcolemmal nuclei are seen together with a subsiding interstitial inflammatory reaction.

Examination on the 2nd day showed only skin erythema over the shin bones. No casts were found in the urine

CASE 11

Male, aged 14, admitted to the mission hospital at 11 PM, had been pinned by both legs. Urine passed after entry was not noticed to be abnormal.

Examination on the second day showed widespread erythema on the anterior aspect of both legs below the knee, and on the dorsa of both feet; there was no apparent swelling and no loss of power or sensation.

CASE 12

Male, aged 56, seen in hospital on the 15th day after the disaster with a nerve compression palsy of the right arm (without muscle or skin lesions) and an extensor palsy of both legs, with faint signs of a fading erythema on the shins. No blood had been noticed in the urine, but albumin had been present on admission.

While no detailed observations were made on these last five cases, they obviously had the same lesion as the
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cited only
its mildest
form.

1

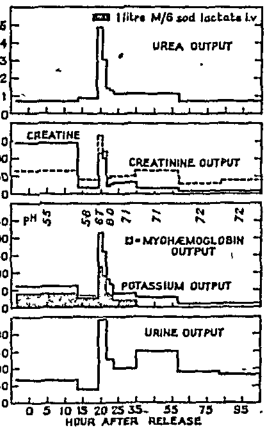
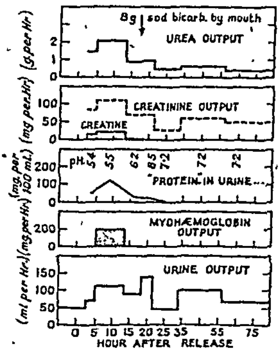


Fig. 1—Case 3. Urinary excretion after release from compression.

2



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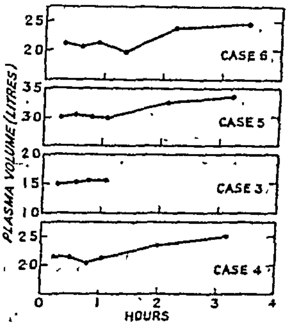

Fig. 2—Case 4. Urinary excretion after release from compression.

Fig. 4—(Addendum of Crooke and Morris). Plasma-volumes measured by Evans blue method. Evans blue injected at zero time in each case.

	Case 6	Case 5	Case 3	Case 4
Weight (kg.)	44·0	66·2	40·6	58·1
Mean plasma volume (l)	2·11	3·03	1·55	2·11
% of body-weight	4·83	4·59	3·82	3·63
Max. deviation from mean	2·4	2·6	2·6	2·4

PLASMA LOSS

The calculation of the amount of plasma lost (by leakage into the damaged area) from the hæmoglobin fall entails three assumptions :

(1) That no bleeding has taken place, either internally or externally ; this would produce hæmodilution in the first 24 hours and lead to a lower ultimate level, thus increasing the apparent loss.

(2) That the plasma volume before the accident was "normal" for the weight. *(It is said to parallel more closely the surface area.)*

(3) That the total blood volume after stabilisation is the same as before the plasma loss.

The conclusion from assumptions (1) and (3) is that the hæmoglobin level after stabilisation is the same as before the accident. That these assumptions are not always valid may be seen by reference to table V, which summarises cases 3–6 ; the severity of the injury clinically runs parallel to the amount and duration of the pigment, "protein" and creatine elimination in the urine. In case 5, however, the plasma loss calculated from hæmoglobin change is too large ; this might be due to bleeding. In case 4 the plasma loss calculated from the data of Crooke and Morris also appears on the high side, perhaps owing to the patient's obesity. Otherwise the calculated losses are consistent with the clinical data, and also in case 3 with the plasma loss calculated from the increase in volume of the thigh compared with the uninjured side.

TABLE V—SUMMARY OF FINDINGS IN CASES 3–6

Case	Plasma loss (ml.)		MyoHb. excretion		Creatine excretion		"Albuminuria" (hr.)	Severity of lesion clinically
	Calc. from Hb. change	Calc. from data of Crooke and Morris	g.	hr.	g.	hr.		
3	670*	480	6·6	36	4·1	120+	104 +	+ + +
4	580	800	1·1	14	0·25	19	22	+
5	1000	270	(2·0 +)	20–28	(1–2)	28	57	+ +
6	285	130	Tr.	8	0·25	22	8	(+)

* Increase in leg volume compared with uninjured side from circumference measurements = 520 ml.

None of these patients showed fall of blood-pressure to shock levels—that is, vasoconstriction was able to maintain a normal blood-pressure, "compensating" adequately for the small fall in total blood volume due to plasma loss—the "first stage" of "shock."

COMPARISON WITH CRUSH SYNDROME AFTER BURIAL BENEATH DEBRIS

Most cases of crush syndrome proper, ordinarily recognised after air-raid damage, are severely injured, with gross and often progressive limb swelling, with clinical "shock" (by which is usually meant a thin thready pulse and a decreased blood-pressure), and with renal function impaired sufficiently to produce a high degree of uræmia or death. Minor grades of damage are, however, being increasingly recognised and occasionally reported as showing the beneficial effects of this or that kind of therapy. But the minor grades still often pass unrecognised, and, until uræmic death occurs, sometimes even the more severe grades. Recently a case has been reported (Albert and Mitchell 1943) from the last war, with an ischæmic contracture and calcification in the injured area, such as is seen in the rabbit subject to a similar experimental injury (Bywaters and Popjak 1942). The diagnosis can now be made earlier. The series of cases reported here illustrates the gradation of injury very well. Observations on case 2 are not sufficiently detailed for us to be able to account for the development of the uræmia ; the patient had suffered as regards extent and duration of the compression similarly to case 3 ; it seems probable that the degree of swelling had been greater, judged by the residual skin looseness. She had also had no alkali treatment. In the remainder of the cases the pH of the urine was relatively high, 5·2–5·5, compared with the pH of 4·6–5·0 observed in both mild severe air-raid cases.

DURATION OF COMPRESSION

We have shown in rabbits subject to a standard compression with rubber tubing that the pH following release does not fall after periods of compression of one hour ; that it falls only very slightly (7·0 to 6·7) after periods of two hours ; and that after periods longer than three hours a maximal fall (e.g., down to 5·5) is obtained. Observations of the degree of hæmoconcentration, blood-urea rise and creatine excretion *indicate that, while little damage is done by* compressions of an hour or less, maximal damage is produced with compression for three hours or more ; in between seems to be the critical period, in which ischæmia produces irreversible changes. The exact length of this critical period may be determined by such factors as temperature (from the work of Allen in 1938).

The period of compression in this series lasted from 8.30 PM to 10 or 10.30 PM (i.e., 1½–2 hours) in the mildest cases (cases 10 and 11), and from 8.30 PM to 10.30 or 11 PM (i.e., 2–2½ hours) in the five patients (cases 1, 3, 4, 5 and 6) in one hospital (allowing half an hour for extrication and carrying to hospital). This is a shorter time than any of the previously observed cases of limb compression due to falling masonry, and may be related to the mild degree of damage and absence of shock. It seems possible that, for periods shorter than 2–3 hours, the ischæmia might be insufficient to produce total necrosis with accumulation of much local fluid, but adequate to produce a local increase of cell permeability with loss of pigment. In the case of spontaneous myohæmoglobinuria described by Millikan (1939), exercise was followed by loss of myohæmoglobin and potassium from the muscles, without apparently any permanent damage. In a case we have described (Bywaters and Dible 1943) probably of this nature, no residual damage from previous attacks was noted. In the rabbits compressed for shorter periods than three hours, only a slight and transient hæmoconcentration occurs, there is no fall of BP, only a slight fall in urinary pH and no local limb swelling ; histologically only a few fibres scattered here and there in the compressed area show degenerative change, and regeneration rapidly takes place from the sarcolemmal nuclei. The change is very similar to that observed in the biopsy material from case 9 ; although no histological material from air-raid cases later than the ninth day has been seen, it is certain that, just as in the rabbit compressed for over three hours, there is complete irrecoverable necrosis with gradual replacement fibrosis spreading into the infarct from the edges, with gross calcification. No hint of any such process was seen case 9. If the ischæmic limb is maintained at a lo temperature, the critical period becomes longer. In th series the ischæmic areas were probably rather warm than in air-raid cases, since they were compressed again other tightly packed human bodies, instead of, as in t air-raid cases, against cold masonry. This would te to increase the severity of the damage relative to t time of compression.

PIGMENT EXCRETION

The chief variable other than duration of compressi affecting the severity of the lesion is, from clinical expe ence, the amount of muscle damaged. This has be confirmed in the rabbit ; a direct relationship has be established between the amount of muscle rendered nec tic and the secondary changes observed (Bywaters a Popjak 1942). In man a good index to this is the amou of myohæmoglobin and creatine released. We ha noticed, however, that with renal impairment only a sm portion of the pigment is excreted. This clinical impr sion is confirmed in three air-raid casualties whose pi ment output has been quantitatively measured. T who succumbed with renal failure showed an output 1·2 and 0·285 g. ; in one patient of Dr. Pochin's w recovered with alkaline therapy Dr. Rimington measur 3·5–4 g. total output (Bywaters et al. 1941). T severest of the four present cases in which pigme excretion was measured put out the record amount 6·6 g. We have recently shown (Bywaters and Stea unpublished data) in the rabbit injected with huma myohæmoglobin in amounts comparable per kg. bod weight to that liberated in man, that the renal dama seen in animals with acid urine is not related to t amount of pigment injected, nor to the amount of pi ment excreted, but to the amount of pigment retained. As in the human cases, it seems probable that the pigment is retained chiefly because of the failure to excrete; in the rabbit experiments, however, it is difficult to see what causes the renal failure other than the injected solution of myohæmoglobin or some impurity therein. The alternative possibility exists, therefore, that the retention of pigment may initiate renal failure. Further experiments are in process and no full answer can yet be given, but these human cases illustrate that arguments based on the failure to produce renal failure in animals with concentrations in the urine and total amounts injected on a basis of body-weight much greater than in human crush cases do not eliminate myohæmoglobin as a causative agent in man.

ALKALI THERAPY

The fact that five cases whose urine was rapidly made alkaline showed no renal failure, whereas one case subject to exactly the same trauma of a similar duration and extent, but without alkalinisation, subsequently developed uræmia is no complete proof of the efficacy of alkali. While the pH of the urine was changed from 5·5 to 6·7 within two hours, it was not until eighteen hours after release that alkali therapy was started. We know that in air-raid casualties with only slight injuries no renal failure will develop, alkali or no alkali. Case 3 was really the only one in which t
alkalinisation affected the cou
lesser degree of urinary acidit
compared with other air-raid
of lesion, together with the al
with its resultant oliguria, is
the lack of renal impairment.
ponding data on case 2 which w
this point are not available.

SUMMARY

Of 12 patients who had been pinned down in a shelter by other bodies, one died of other injuries soon after release; one developed a high grade of uræmia but ultimately recovered; and the other 10 showed every
e damage to skin

"crush syndrome"
—ischæmic muscle necrosis following burial beneath debris as the result of aerial bombardment—but less severe, perhaps because of the short time of compression (1½–2½ hours).

Quantitative estimation of myohæmoglobin, creatine and potassium excretion gave a basis for the calculation
1; this was the best
and ran parallel to the
e local plasma loss as
ation, (b) Crooke and
and (c) limb swelling.

No conclusions can be drawn as to the efficacy of alkali therapy.

PLASMA-VOLUME DETERMINATIONS BY THE EVANS BLUE METHOD

An estimation of plasma volume by the Evans blue method of Crooke and Morris (1942) was made on 4 patients (cases 3, 4, 5 and 6). The results are shown in
plotted
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of the

the average of three readings taken during the first hour. These are as follows:

Case	*Plasma vol. in litres*	*Plasma vol. % body-weight*
6	2·11	4·83
5	3·03	4·59
3	1·55	3·82
4	2·11	3·63

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These estimations were made between 3·15 and 4 PM, some 17 hours after release from compression.

(*Continued at foot of next column*)

LOCAL THERAPY OF WAR WOUNDS

II. WITH SULPHASUXIDINE *

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BA CAMB
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THE investigation of succinyl sulphathiazole ('Sulphasuxidine') in the Central Pathological Laboratory, MEF, confirmed its claim to be a drug of interesting and valuable properties. When taken by mouth it is to a small extent broken down to sulphathiazole in the intestinal tract, and while absorption is very slight even when doses of 60 g. are taken daily, all organisms except fæcal streptococci are eliminated from the fæces, and clinical improvement in dysentery is manifest. Its use in colonic surgery, and in the management of abdominal gunshot wounds, is clearly indicated.

It was decided to investigate its properties as a local therapeutic agent in infected gunshot wounds.

Absorption of Sulphonamides

One of the main problems in all sulphonamide therapy is to ensure that neither the rate nor the degree of absorption is great enough to cause severe toxic symptoms or other complications due to sulphonamide poisoning. This problem becomes particularly acute when these drugs in the powder form are applied to open wounds. It is therefore not irrelevant at this stage to give a few

examples given below include: some burn cases which were treated with sulphonamide powders or emulsions; 2 cases of sulphadiazine given intraperitoneally; 1 case of sulphathiazole given in the same way; and [illegible]
[illegible]
where.

CASE A.—Extreme third-degree burns of both legs; powdered with 17 g. of sulphanilamide, three weeks after injury. The rise of blood concentration was as follows:

Hours after powdering ..	½	1	2	3	4	5	7½	10½	23	26
Blood concentration (mg. per 100 c.cm.)	6·9	11·4	13·3	13·3	14·4	17·0	16·1	17	15·1	13·0

CASE B.—Treated with 35 g. of sulphanilamide after only 35 min. delay. The blood concentration after 6 hours was 25 mg. per 100 c.cm.; after 24 hours 16·7 mg., followed by a gradual fall.

Several cases were treated with sulphaguanidine and sulphathiazole powders, the burns being of the same order of severity as those in cases A and B. With these two drugs the blood value was far lower.

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* Part I, dealing with penicillin, appeared last week.

(*Continued from previous column*)

I am indebted to Sir James Walton, Mr. W. H. Rothwell, Dr. I. A. J. McCready and Dr. A. J. Watson for allowing me to see patients under their care; to Dr. A. C. Crooke and the nursing staff for their help; to Miss Stead (for whose services we are dependant on a grant from the Medical Research Council) who performed the biochemical analysis; and to Dr. Keith Simpson for giving me access to postmortem material and allowing me to quote his own report.

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CASE C.—Sulphathiazole, 10 g., was put on an extensive second-degree, patchy third-degree, burn 4 hours after injury and the blood concentration never rose above 3 mg. per 100 c.cm.

The low level was maintained when sulphaguanidine was used, characteristic figures being 5·7 mg. ; 3·5 mg. ; 1·1 mg. If the drugs were applied in the form of an emulsion, however, the blood concentration remained low even in the case of sulphanilamide. Figures obtained with sulphanilamide and soft-paraffin emulsion included 1·2 mg. ; 0·94 mg. ; 3·8 mg. ; 1·4 mg. One fatal case was noted after treatment with sulphanilamide in which the blood concentration reached 40 mg. In many of these cases the urinary concentrations tended to be high. These results show that it is dangerous to use the more soluble sulphonamide drugs in the powder form over wide areas.

Two patients on whom appendicectomies were being performed received powdered sulphadiazine intraperitoneally. This drug has a low solubility (13 mg. at 37° C. and pH 7·2) and the rate of absorption was low. After 10 g. intraperitoneally at 10.30 AM on Oct. 23 the blood concentrations were :

Date in Oct. 1942	23	23	23	23	24	24	25	26	28
Time ..	12.30 PM	2.30 PM	6.30 PM	10.55 PM	10.30 AM	6.30 PM	10.30 AM	10.30 AM	10.30 AM
Conc. of free drug (mg. per 100 c.cm.) ..	1·8	2·2	2·7	3·2	2·2	1·8	1·4	1·04	0·46

The second set of figures are not reliable since the patient had received sulphanilamide by mouth before the operation ; however, the increase in blood concentration followed a similar course to the one shown above.

One patient received 10 g. of sulphathiazole intraperitoneally at 11 AM on Jan. 9, and the figures for the blood concentration were :

Date in Jan. 1943	9	9	9	10	12
Time ..	2 PM	4 PM	6 PM	12 Noon	12 Noon
Conc. of free drug (mg. per 100 c.cm.)	4·07	5·28	5·4	2·6	0·37

STUDIES ON SULPHASUXIDINE

The advent of sulphasuxidine seemed to introduce obvious advantages. When this drug is given orally the amount of absorption is extremely low, the blood value being about half that found with sulphaguanidine even when the dosage exceeds 20 g. daily. It seemed possible that if sulphasuxidine was put into a wound or on a burn, a reservoir of free sulphathiazole would be produced as the drug was slowly broken down. Previous workers had claimed that sulphasuxidine is split by bacteria to yield free sulphathiazole, and because of this it seemed possible that external application would provide a continuous potential source of free sulphathiazole, the rate of breakdown being roughly proportional to the severity of the infection. The rate of absorption and degree of breakdown were compared with those of sulphanilamide and sulphathiazole.

Some experiments were carried out with sulphanilamide, sulphathiazole and sulphasuxidine based on the experiment of Hawking.[1] A transverse incision was made in the lumbar muscles of rabbits (weight 1000 g.) and 0·25 g. of drug, made into a paste, was inserted. The fascial covering of the muscle was sutured and any surplus drug wiped away. The skin wound was also closed ; 6 and 24 hours later the rabbits were killed and transverse slices of lumbar muscle about 0·5 cm. thick were taken at various distances from the wound. Heart blood, and muscle from the opposite thigh, were also taken. The concentration of free drug was then determined, the results being expressed as mg. of drug per 100 c.cm. of blood or per 100 g. of muscle (table I).

TABLE I—CONCENTRATION OF SULPHONAMIDES AT VARIOUS DISTANCES FROM AN EXPERIMENTAL WOUND, AND IN THE BLOOD, 6 HOURS AND 24 HOURS AFTER APPLICATION

Sulphonamide and period of application	Muscle concentration (mg./100 g.)				Blood concentration (mg./100 c.cm.)
	Sides of Wound	1–2 cm. away	4 cm. away	Opposite thigh	
Sulphanilamide (6 hr.)	220	29	1·7	1·8	2
Sulphanilamide (24 hr.)	20	3·7	3·6	1·1	Trace
Sulphathiazole (6 hr.)	Solid drug still present	185	14	2	0·4
Sulphathiazole (24 hr.)	230	26	6	4	0·5
Sulphasuxidine (6 hr.)	F : 0·75 T : 243	F : 47 T : 14	F : 3·6 T : 1·7	F : 3·4 T : 4·6	F : trace T : 0·82
Sulphasuxidine (24 hr.)	A low uniform concentration in all specimens amounting to about 1 mg. per 100 g. The amount of water used in extracting the specimen was too large for accurate estimation.				..

F = free. T = total.

These results are in agreement with those observed in the treatment of burns. The more soluble sulphanilamide rapidly reaches a maximum concentration and is rapidly excreted, whereas sulphathiazole diffuses far more slowly. In the case of sulphasuxidine there is a progressive and decreasing difference between the free and the total drug demonstrating once more the capacity of plasma to break down sulphasuxidine into the free compound.

Further experiments were carried out to show the rates of absorption when sulphanilamide, sulphathiazole and sulphasuxidine were put in the peritoneal cavity of a rabbit, the drugs being suspended in lanoline and in saline. The blood concentrations were estimated 24 and 48 hours afterwards and all the rabbits were killed after 7 days (table II).

TABLE II—RATES OF ABSORPTION OF SULPHONAMIDES FROM PERITONEUM OF THE RABBIT

Experiment	Concentration (mg. per 100 c.cm. of blood) after :		
	24 hr.	48 hr.	7 days
1. Sulphanilamide in saline, 10 c.cm. of 20% suspension	4·0	0·89	Large fat clot in peritoneum.
2. Sulphathiazole in saline, 10 c.cm. of 20% suspension	1·1	2·2	Nil abnormal.
3. Sulphathiazole in lanoline, 10 c.cm. of 20% suspension	0·83	0·62	Fat clot as in 1.
4. Sulphasuxidine in saline, 10 c.cm. of 20% suspension	F : Faint trace T : 2·3	F : 0·5 T : 2·3	Nil abnormal.
5. Sulphasuxidine in lanoline, 10 c.cm.	F : Nil T : 0·6	F : 0·6 T : 1·5	Fat clot as in 1.

F = free. T = total.

As was expected, these experiments showed greater absorption from the saline than from the lanoline ; and, as before, the more soluble sulphanilamide was absorbed the quickest. The fat clot on section showed a high degree of organisation. It had all the appearances of fatty tissue (i.e., alveoli with fine fenestration) : on the outside was a layer of coagulated lymph and medial to this an area of intense infiltration with polymorphs and large mononuclear cells.

A few experiments were carried out in vitro to determine the degree of breakdown of sulphasuxidine in various fluids. A very small amount of the drug is liberated when a tablet is broken and shaken with water. This breakdown increases with rise of temperature and with increase of time between suspension and estimation, but even after 24 hours at 37° C., a 0·5 g. tablet in 100

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[1] Hawking, F. *Brit. med. J.* 1941, i, 263.

c.cm. of water gave a concentration less than 0·5 mg. In suspension with dilute acids or alkalis the breakdown is increased. One of the main difficulties of estimating the breakdown is that the estimation must be carried out in acid solution, and hence there is a danger of increasing the breakdown; in alkaline solutions there is a danger of causing precipitation. The drug is completely broken down to free sulphathiazole by heating with mineral acids on a water-bath. A suspension of the drug in the
tion of free
he control.
a consider-
able increase in breakdown as compared with suspensions in water, and this remains true even if the serum has been heated to 56° C. for two hours. Figures varied widely, as the following show:

—	Sulphasuxidine, 0·5 g., plus:			
	Pus (10 c.cm.)	Pus (5 c.cm.) and saline (5 c.cm.)	Water (10 c.cm.)	Saline (10 c.cm.)
Concentration of free sulphathiazole after 17 hr. at 37° C. (mg./100 c.cm.)	150	56	9·0	9·3

Other samples gave lower figures, such as 46 mg. per 100 c.cm.; 35 mg. and 42 mg., when estimations were carried out as above using 10 c.cm. of pus; 2 samples of pleural fluid gave values of 45 mg. and 25 mg.

Estimations were also carried out on the fluid from wounds into which 20% sulphasuxidine in lanoline had been put. About 30 c.cm. were usually put into the wound and an estimation of the free drug in the wound fluid was made after 24 hours. The amount of free sulphathiazole varied considerably, figures including: 2·2 mg. per 100 c.cm., 2·6 mg., 32 mg., 27 mg., and 35 mg. The blood concentrations never exceeded 1 mg. of free drug. In one case where powdered sulphasuxidine was put into the wound, a concentration of 150 mg. was found in the wound fluid. This result was unreliable owing to solid particles of the powder still remaining.

CONCLUSIONS ON ABSORPTION

Experimental findings suggest that:

1. The probable rate of absorption of sulphonamide drugs can be forecast from a knowledge of their solubilities.
2. The most soluble are most likely to produce dangerously high concentrations and are best used in suspension.
3. The breakdown of succinyl sulphathiazole into free sulphathiazole in ordinary solvents—including plasma, cerebrospinal fluid and fluid from wounds—is too small to produce a dangerous blood concentration.
4. The breakdown is increased by rise of temperature.

Therapeutic Tests

Sulphasuxidine applied locally in the form of a 20% lanoline cream appeared to limit quickly and effectively the gram-positive flora, to control suppurations and accelerate healing. No toxic or irritant properties of any kind were noted. Absorption was less than 1 mg. per 100 c.cm. of blood. The cream was heated to 40° C., and then applied to wounds with a syringe used as a grease-gun.

It is quite possible that other sulphonamides applied in this way would have given equally good results; however, the "reservoir" potentialities of sulphasuxidine are, at present, a unique feature from a theoretical point of view. If this drug is used intraperitoneally, the lanoline cream should not be used, as it acts as a foreign body. Probably a microcrystalline form would be best.

Results in 8 cases are set out in table III.

DISCUSSION

HEALING OF WOUNDS

This series of cases is a small one. For this there are several reasons—the length of time taken on account of the individual care required, the movement of patients to other centres necessitated by Service conditions, and the number of other duties in a routine laboratory. Moreover, most wounds are encased in plaster and are inaccessible. The results are presented in an attempt to encourage the local treatment of wounds, and in the belief that this is not carried to its logical conclusion at [illegible] that sulphonamide prophylaxis [illegible] of value, and if it is further [illegible] that its action, owing to breakdown and absorption, is temporary, then it is reasonable to suggest that repeated application can extend the prophylactic value. The same argument holds for penicillin treatment; observation shows that one application will not give permanent results, and the process must be continued. Similarly, all local applications must be made on a raw surface; pus must be removed.

Up to the present, the number of Allied wounds have fortunately been few compared with the numbers in the last war. The total allied casualties in the battle of El Alamein were less than those inflicted in two days of the Somme battle. Surgeons in this war to date cannot speak from anything like the experience of those of the last war. They have however modified greatly last-war methods, in particular with regard to closed-plaster technique.

The advantages of this method are obvious even to one not a surgeon. The relief of pain, and ease of nursing of a patient with the severest injuries is striking. It is obviously admirable for a large number of cases, but it does interfere with local treatment of infection.

One compromise is the use of a window in the plaster, and this has been used in some of the cases described. Its disadvantages are: first, the risk of new infection, though this in our opinion is more than balanced by the benefit of the therapy; and the more serious disadvantage that the wound tends to bulge out through the window, compressing the edges, and causing pain. Here a further compromise is possible. After a period during
be
was
a compound fracture of femur, infected with hæmolytic *Staph. aureus* and hæmolytic streptococci. It showed no reaction at all to penicillin, even applied thrice daily in a 1% solution, and even though the organisms in vitro proved susceptible; it did not react to sulphathiazole microcrystals, to sulphasuxidine, or to proflavine. Two others showed an initial reaction to penicillin, but then
ure; and
were both
were first

One of these cases was then treated with proflavine powder, and the wound was covered with a wire cage. It scabbed over, and the profuse suppuration ceased. On two occasions associated with the lighting up of wounds elsewhere this wound too became active, and brisk suppuration set in; but when the pus had been cleaned away the infection again subsided, and was eventually put up in closed plaster, well on to complete healing.

No-one can observe the process of healing in wounds without being impressed by certain facts. The minimum
essential; to drag off
ft-paraffin gauze, is to
In many cases a wire
, above the plaster, and
wound surface is left open.
and the use of many-tail band
of the limb, gives the patient ease and makes him look forward to the dressing, not with apprehension but with relief.

Finally, gross as is the disturbance caused by a suppurating wound to a patient's general well-being, the converse is equally true: a wound showing no tendency to heal undergoes a profound change when the patient's general condition improves; attention to his diet, [illegible] psychological state, his general comfort are all part [illegible] essentials of wound treatment. While this [illegible] can scarcely be pursued without leaving the [illegible] pathology, it is within the province of that [illegible]
a patient an urgent problem. It may [illegible] greatest single necessity; in its [illegible] are relatively useless, in its [illegible] far less.

TABLE III—EIGHT CASES TREATED WITH SULPHASUXIDINE CREAM (SX. CR.) OR SULPHASUXIDINE POWDER (SX. P.)

Case and date	State of wound and progress	Treatment	Smear (S) and Culture (C)
CASE 1	Patchy 3rd degree diesel-oil burns, both hands; sl. suppuration	Sodium sulphate	..
Nov. 6, 1942	Cleaned and dressed	10 c.cm. of sx. cr. on each hand	S: pus cells + +; gram-pos. cocci and gram-neg. bacilli in mod. nos. C: no hæmolytic streptococci; *Staphylococcus albus*; coliform bacilli
Nov. 10	Both hands healing. Small patch 3rd degree, rt. hand, not healed	7·5 c.cm. of sx. cr. on each hand	S: pus cells +; few gram-pos. cocci and gram-neg. bacilli. C: a few *Staph. albus*
Nov. 11	Blood concentration: nil	..	..
Nov. 16	No discharge; all areas healing well	5 c.cm. of sx. cr. on each hand	S: a few pus cells; no organisms. C: sterile
Nov. 17	Blood conc.: nil	..	..
CASE 2 Nov. 2, 1942	Gutter-wound rt. shoulder, 4 × 2 in., extending down and in from post. axillary border over wing of scapula. Slightly dirty	Eusol dressings and oral sulphonamides	..
Nov. 8		Sulphonamides stopped, after 21 g. given	..
Nov. 10	Wound v. dirty and foul smelling; fair amount of discharge	10 c.cm. of sx. cr. over shoulder	S: pus cells + + +; gram-pos. cocci in large nos. C: hæm. *Staph. aureus*, and hæm. strep., mod. growth
Nov. 11	Blood conc.: 0·2 mg. per 100 c.cm.	..	..
Nov. 15	No discharge; wound pink and healthy; pt. feels well	10 c.cm. of sx. cr.	S: pus cells + +; few gram-pos. cocci. C: hæm. *Staph. aureus*, a few colonies
Nov. 19	Clean wound; no discharge	4 g. of sx. p. to wound. Final treatment	S: few pus cells. C: sterile
Nov. 20	Blood conc.: nil	..	..
CASE 3 Nov. 9, 1942	Foul-smelling severe wound of lt. thigh with great skin loss and gross infection; oozing dark green pus from pocket connected with surgical incision on other side. Pt. felt well. Eusol used to deodorise, not applied to wound	20 c.cm. of sx. cr.	S: pus cells + + +; heavy infection with gram-pos. cocci and gram-neg. bacilli. C: hæm. strep.; *Staph. albus*; coliform bacilli
Nov. 12	Copious discharge, foul-smelling, greenish-yellow; much pus aspirated from pocket	Same	S: pus cells + + +; gram-pos. cocci in large nos. C: free from hæm. streps.
Nov. 13	Much less discharge and smell; tissues looked healthy. Pt. much better	,,	S: pus cells + + +; mod. nos. gram-pos. cocci. C: hæm. strep., mod. growth
Nov. 14	Little discharge; still a little pus collecting in deep pocket; dull pain below wound during night	,,	S: pus cells + +; mod. amount of gram-pos. cocci. C: hæm. strep., mod. growth
Nov. 15	Pt. fit; no discharge; clean passage from wound to incision on other side	,,	S: pus cells + +; mod. nos. gram-pos. cocci. C: hæm. strep., mod. growth
Nov. 17	No discharge; nothing aspirated; tissues healthy	,,	S: pus cells +; a few gram-pos. cocci. C: hæm. strep., a few cols.
Nov. 19	No discharge; tissues healthy	,,	S: A few pus cells; a few gram-pos. cocci. C: hæm. strep, 4 cols.
CASE 4 Oct. 23, 1942	Through-and-through wound, lt. thigh	Sulphanilamide and soft-paraffin gauze	..
Nov. 3	Dirty entry and exit wounds, heavily infected, much loss of skin; connected by drains; exuding large amount of foul-smelling greenish pus	10 c.cm. of sx. cr. to wounds	S: pus cells + + +; mod. nos. gram-pos. cocci. C: hæm. *Staph. aureus*, free growth; coliform bacilli
Nov. 4	Blood conc.: nil	..	..
Nov. 5	Both wounds healthy; little discharge; pt. felt well	Same	S: pus cells + +; few gram-pos. cocci and gram-neg. bacilli. C: *Staph. aureus*, 10 cols.; pyocyaneus, a few cols.
Nov. 8	Drain removed; wound healthy, a little discharge	,,	S: pus cells + +; few gram-neg. bacilli. C: pyocyaneus, few cols.
Nov. 9	Blood conc.: nil	..	..
Nov. 11	No discharge from wound; no complaints	,,	Scanty pus cells; few gram-neg. bacilli. C: pyocyaneus, few cols.
Nov. 12	Blood conc.: nil	..	..
Nov. 19	2 dry dressings since last treatment. Ready for skin graft	..	..

TABLE III—(*continued*)

Case and *date*	State of wound and progress	Treatment	*Smear (S) and Culture (C)*
Case 5	Perforating wound, lt. side chest wall. Fracture of ribs 9, 10 and 11	Sulphanilamide, soft-paraffin gauze, eusol dressings	..
Nov. 11, 1942	V. deep unhealthy-looking wound, tender to touch; copious discharge; fairly foul smell. Compound fracture of ribs; old empyema operation	7 c.cm. of sx. cr.	S: pus cells + + +; mod. nos. of gram-pos. cocci and gram-neg. bacilli. C: hæm. strep., *free growth; coliform bacilli*
Nov. 12	Mod. amount of discharge, removed by suction; fairly clean wound left; no smell	10 c.cm. of sx. cr.	S: pus cells + +; mod. nos. gram-pos. cocci. C: hæm. strep., free growth
Nov. 13	Little discharge; all tissue pink and healthy	7·5 c.cm. of sx. cr.	S: pus cells +; a few gram-neg. bacilli. C: coliform bacilli, few cols.
Nov. 14	Pt. well; dull pain during the night. No discharge; wound beginning to granulate	6 c.cm. of sx. cr.	S: pus cells +; few gram-pos. bacilli. C: hæm. strep., 7 cols.
Nov. 16	No discharge; no complaints	6 c.cm. of sx. cr.	S: few pus cells; few gram-pos. cocci. C. hæm. strep., 11 cols.
Case 6 Oct. 26, 1942	Perforating wound, lt. thigh; loss of fair amount of tissue	Sulphonamide and soft-paraffin gauze	.
Nov. 3	[illegible], but not [illegible] l., fairly [illegible] s; fairly [illegible]	20 c.cm. of sx. cr. put on wound: 5 c.cm. on entry, 15 c.cm. on exit	S: pus cells + + +; mod. nos. gram pos. cocci. C *Staph. aureus*, mod. growth
Nov. 4	Blood conc.: nil	..	..
Nov. 5	Little discharge; tissue looked healthy; granulation. Pt. looked and felt fit	15 c.cm. of sx. cr. on wound	S: pus cells + + +; few gram-neg. bacilli. C: sterile
Nov. 8	Drain removed on Nov. 7. Wound healthy; much granulation; no discharge. Pt. v. fit	Same	S: pus cells +; few gram-neg. bacilli. C: sterile
Nov. 9	Blood conc.: nil	..	..
Nov. 11	No discharge; tissue healthy. Pt. had use of leg except for straightening out	Same	S: scanty pus cells, few gram-neg. bacilli. C: coliform bacillus, a few cols.
Nov. 12	Blood conc.: nil	..	.
Nov. 19	2 dry dressings since last treated; wound clean, ready for surgical treatment	.	..
Case 7	Admitted Oct. 15 with cellulitis, rt. forearm and elbow. Large abscess, forearm; adenitis + + +	Sulphonamide powder and soft-paraffin gauze, Oct. 19–22. Abscess opened, Oct. 31. Oral sulphonamide, Oct. 15–Nov. 2	..
Nov. 6, 1942	Sl. discharge from both areas; ulcer resisted treatment	5 c.cm. sx. cr. to forearm	S: pus cells + + +; gram-pos. cocci in clumps + +. C: hæm. *Strep, aureus*, free growth
Nov. 8	No discharge; beginning of granulation; both wounds clean	5 c.cm. to each wound	S: few pus cells; few gram-pos. cocci. C: *Staph. aureus*, mod. growth
Nov. 9	Bl. conc.: nil	..	..
Nov. 12	Forearm wound scarred over; elbow wound clean, but not covering over, probably owing to movement	5 c.cm. of sx. cr. to elbow	S: pus cells +; no orgs. seen. C: sterile
Nov. 18	Elbow wound beginning to heal; no discharge	2·5 g. of sx. p.	Nil abnormal
Case 8 Oct. 26, 1942	Infected 2nd degree diesel oil burn of lt. ankle with small 3rd degree area	'Tannafax' applied within 20 min., then eusol for 2 days	..
Nov. 2	Burn 9½ by 4¾ in., dirty and neglected	Cleaned; sx. cr. 30 c.cm. of 20% soln. (6 g.)	S: pus cells + + +; large nos. gram-pos. *cocci. C:* hæm. strep. *Staph. albus.*
Nov. 3	Blood conc.: nil in 10 hr.; 0·2 mg in 14 hr.	..	..
Nov. 8	Dressing removed. Only one small area of 3rd degree burn not healing. Remainder covering with skin.	Sx. cr., 20 c.cm. of soln. (4 g.)	S: pus cells + + +; few gram-pos. cocci. C: *Staph. albus*, a few cols.
Nov. 9	Bl. conc.: nil	..	..
Nov. 12	Wound clean; epithelium covering burn. All 2nd degree areas covered. Small pocket of pus around hair follicle	Sx. cr. 10 c.cm. of soln. (2 g.)	S: skin, pus cells +, no orgs.; follicle, pus cells + +, gram-pos. cocci. C: no growth
Nov. 13	Bl. conc.: nil	..	..
Nov. 18	Completely healed	Dry dressing only	..

SUMMARY (Parts I and II)

Treatment of infected war wounds with the calcium or sodium salts of penicillin rapidly reduced the numbers of gram-positive organisms, including clostridia, staphylococci, streptococci, and corynebacteria. Gram-negative organisms were unaffected. Therapeutic were excellent.

Experiments with *Penicillium notatum* cult were promising.

In applying powdered sulphonamides to

ing surfaces such as burns, wounds or the peritoneum, there is danger of producing an excessive concentration of the drug in the blood. The more soluble sulphonamides are therefore unsuitable for this purpose.

Experiments showed that plasma and other wound fluids break down succinyl sulphathiazole into free sulphathiazole; but the rate of breakdown is so slow that there is no risk of sulphathiazole being absorbed into the blood in dangerous quantities.

Local application of a lanoline cream containing 20% succinyl sulphathiazole quickly controlled wound infections by gram-positive organisms. No toxic or irritant effects were observed, and the blood contained less than 1 mg. of sulphathiazole per 100 c.cm. This lanoline cream is not recommended for intraperitoneal use.

The surface of wounds should be disturbed as little as possible. Aspiration of pus and the use of many-tailed bandages are recommended.

Attention to the mental state, general comfort, and especially the diet, is an essential part of the treatment of wounds.

These investigations were carried out in the Central Pathological Laboratory, MEF, by the staffs of that laboratory and of the laboratory of the Scottish General Hospital. The post-mortem examinations were carried out by Capt. A. D. Morgan, RAMC. The bacteriological controls were made in collaboration with Sergeant J. Pilling, RAMC, Sergeant L. C. Wilson, RAMC and Private H. Rosenband-Pollack, Palestine ATS.

We wish to thank Colonel H. D. F. Brand, RAMC, commanding the Scottish General Hospital, and the surgical staff of that hospital and its attached units, and in particular Colonel J. S. K. Boyd, RAMC, DDP, MEF, under whose general direction the investigations were made.

EXPERIMENTAL ALLOXAN DIABETES IN THE RAT

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IN 1889 v. Mering and Minkowski demonstrated that total pancreatectomy caused fatal diabetes mellitus in dogs. Their work has led to a great increase in our knowledge of diabetes, partly by promoting more intensive study of glycosuria, partly by directing the morbid histologist to more intimate investigation of the pancreas, but with most practical outcome by initiating the investigations which culminated in the discovery of insulin by Banting and Best (1921). Nevertheless, the classical experiment of over fifty years ago has had little or no influence on the doctrine of the ætiology of diabetes or on its prevention. Joslin (1937), in discussing prevention, refers almost solely to measures calculated to avoid hereditary transmission, and to care in dietary such as will lessen the likelihood of obesity. The value of these practical suggestions need not be doubted, for they refer to recognisable ætiological factors; but it is not claimed that they are based on exact knowledge of the pathogenesis of diabetes or of the part that may be played by disease of the pancreas in initiating the malady.

In recent years the work which has shown most promise for elucidation of pathogenesis is that of F. G. Young (1937) who discovered that diabetes could be produced in dogs by repeated injections of an extract of the anterior pituitary. Early in the course of the injections definite histological changes could be recognised in the pancreatic islets (Richardson and Young 1938, Richardson 1940). Later, when diabetes had been established for many weeks, the islets were permanently altered. In one case there was profound reduction of β-cells and in another extensive hyalinisation of islets with loss of almost all the specific cells; in this second case there was also a subacute pancreatitis affecting the acinar tissue. This research showed that a diabetic state can be produced by the action of a derivative of body tissue, and there may be deeper significance in the fact that the extract is derived from a [illegible] concerned in the fine adjustment of normal nutrition. Also the histological results suggest that while the effective inoculum is obtained from the hypophysis it acts by influencing the islets of Langerhans.

In a previous paper (Dunn, McLetchie and Sheehan 1943) it was shown that selective necrosis of the pancreatic islets could be produced acutely in rabbits by pure chemicals, particularly alloxan. The first successful results in the production of diabetes with alloxan have since been obtained in rats.

The rats were albinos of a pure Wistar strain, and young adult males were used. They were ordinarily fed on hospital kitchen scraps consisting of potato, egg, meat, fats, and milk puddings. Animals which developed polyuria were supplied with abundant water. On this diet rats normally passed only about 5 c.cm. of urine daily, free from glucose. In earlier experiments the urine was collected on filter-paper in drops exuded when the animal was stretched. Such samples could be tested qualitatively for sugar by Benedict's reagent. In later experiments metabolism cages were available for collection of urine.

ACUTE EFFECTS OF ALLOXAN

The acute effects were examined in seven rats. One (No. 1) was injected intramuscularly and five (Nos. 2, 4, 9, 10, 12) subcutaneously with alloxan equivalent to 300 mg. per kg. body-weight; one (No. 11) received 400 mg./kg. subcutaneously. The clinical and the pathological effects varied. No. 10 showed no evidence of upset and when it was killed on the 4th day the pancreatic islets were normal; No. 4, though ill and off its food, also gave a negative histological result when killed at 48 hrs. In the other five animals well-marked lesions were found.

Nos. 1 and 2, hunched up and weakly, were killed at 6 hours. In both, the islets were universally affected: a large proportion of the cells throughout each islet were shrunken, rounded off and displaced from their attachments: their protoplasm was eosinophil and hyaline, and their nuclei pyknotic: a few cells among these retained normal characters (fig. 2). Two islets in the pancreas of No. 2 were of peculiar structure in having a wide peripheral cuff of large cells free from necrosis and with abundant eosinophil granular protoplasm and large active nuclei. These were judged to be α-cells, restricted to these two islets and surrounding a central mass of β-cells, many of which were necrotic (fig. 3).

No. 9 was ill and did not eat until the second day; glucose and insulin were given; there was glycosuria on the third day. When it was killed on this day the islets showed extensive lesions of later date than in Nos. 1 and 2. Many cells were crumbling to debris, others were loose and rounded off with pyknotic nuclei, and in a state from which recovery appeared doubtful: in contrast a proportion of cells remained in live state with normal or active nuclei; these had normal attachment to stroma and sometimes occurred in short ribbons. At the periphery of the islets there were numerous cells with small bodies and active nuclei; mitoses were very rarely observed.

No. 11 died, cold and drowsy, at 48 hours; there was no glycosuria. The changes in the islets were as in No. 9 but more severe, with more necrotic debris and more cells of doubtful viability, while obviously live cells were fewer. There were, in addition, very pronounced lesions in the small ducts in this pancreas, comprising dilatation and accumulation of wax-like eosinophil masses with leucocyte infiltration in the walls and in the interstitial septa: this lesion could be interpreted as an early pancreatitis.

No. 12 stopped eating on the second day and was hunched up and cold. Injections of glucose were given with insulin and the animal survived until the 4th day when death occurred in coma. The blood-sugar was then found to be only 0·01 g. per 100 c.cm. In the islets in this case most of the cells were normal and in situ, but scattered among these were a number of cells with shrivelled bodies and pyknotic nuclei, while granular debris of broken-down cells occurred here and there.

These few experiments, though they were only first trials, showed that in the rat as in the rabbit the pancreatic islets could be selectively and sometimes severely damaged by alloxan: the β-cells appeared to be chiefly if not exclusively affected. As compared with the lesions described in the rabbit, the necrosis tended to involve individual cells distributed through the islet rather than to destroy completely a central mass of

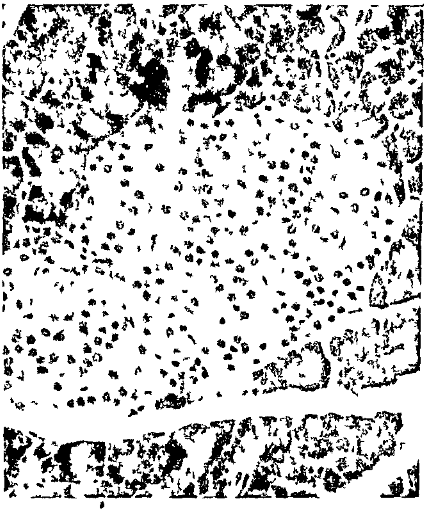

Fig 1—Normal islet of rat. (x 350)

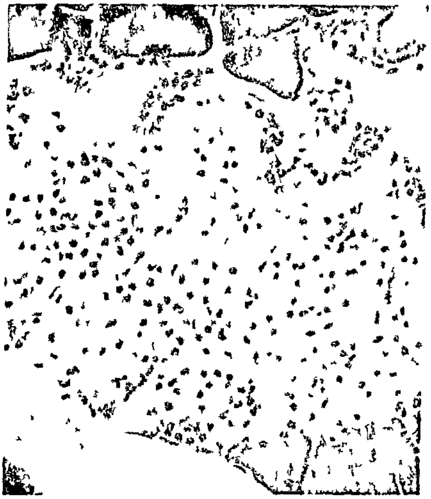

Fig 2—Islet from rat No 1 showing extensive early necrosis of cells a few ribbons of live cells survive at the top (x 350)

cells In No 4 at four days the lesion was clearly in a healing stage

PRODUCTION OF DIABETES

A continuing glycosuria was established in five rats by a series of injections given in a tentative fashion until success was achieved In most cases injections of glucose or glucose with insulin were administered from time to time because it was thought that early fatalities were due to hypoglycæmia The methods employed are not necessarily the best that could be devised

The doses administered subcutaneously, in mg /kg body weight, were

Nos 3 and 5—300 (1st day) 25 (6th and 7th), 150 (8th), 100 (9th), 200 (10th, 19th and 20th), 150 (21st), 200 (23rd and 24th) and 400 (27th) Total 2 15 g /kg in 27 days

Nos 6 and 7—300 (1st day), 50 (6th and 7th), 150 (8th), 100 (9th), 200 (10th) Total 0 85 g /kg in 10 days

No 13—300 (1st day), 200 (16th), 300 (27th) Total 0 8 g /kg in 27 days

The effects observed were as follows

No 3—From the 1st to the 20th day this animal appeared to be slightly out of condition and its weight fell from 290 g to 250 On the 21st day, for the first time, drops of urine reduced Benedict's solution and this continued for a week without increase of urinary volume above normal Polyuria, 15–20 c cm, developed on the 28th day and continued, while glycosuria increased, reaching 4% During this time the rat ate about twice the usual amount of food A mass of solid fat was given and eaten on one day and the urine the next day gave a weakly positive Rothera reaction From the 30th to the 35th day two units of protamine zinc insulin was injected daily The volume of urine and its sugar content gradually diminished and on the 35th day the urine was sugar free, the insulin was then discontinued and polyuria (25 35 c cm) with glycosuria (3 9–4 5%) returned The body weight, which had been stabilised at 240–250 g by insulin, fell to 210 g by the 38th day The animal, previously active, became lethargic and hyperpnœic Albuminuria which had been slight, increased to a heavy cloud Acetonuria appeared on the 42nd day The animal was killed on the 45th day at death the blood sugar was 0 352 g /100 c cm

Post mortem large chronic abscesses were present in the lungs The kidneys, en
tubular nephritis with
many of the lower tul
slightly enlarged The pancreas was outwardly normal, but there was an extreme reduction in the number of islets In sections from 23 blocks of pancreas only nine small islets were found similar sections from the pancreas of a normal rat each contain from one to four islets of 100 × 150μ diameter and occasionally a very large one of 450 × 225μ (cf fig 3) Some of the islets in this diabetic pancreas were though diminutive of fairly normal structure in others the cells were very irregular in size and abnormal in arrangement Some of the cells, especially central in the islet, were swollen and rounded and exhibited varying degrees of pallor in staining of protoplasm but without vacuolation The peripheral cells were usually much smaller than normal, and had hyperchromatic nuclei

No 5 ran a course similar to No 3 developing glycosuria on the 11th day, but it behaved with normal activity during the period of the injections From the 27th day, when the injections ceased, it ate and drank excessively Unlike a normal rat, it slept very little by day but continued eating or nosing at food about four times the normal amount of food was consumed, while the daily intake of water was 50 to 80 c cm (¼ to ⅓ of the body weight) There was a continuous polyuria of 35–70 c cm with 3 5 to 7% of glucose From the 40th day there was acetonuria even without feeding of fat and this increased markedly so that when diluted ten times the urine still gave a positive result even with ferric chloride The urine had a faint cloud of albumin but in spite of polyuria the urea concentration continued at about 1 5% By voracious eating this animal just managed to keep its weight steady at 200 to 220 g but from the 52nd day a rapid deterioration set in He ate less and became emaciated, his coat was lax and his eyes sunken and yellowish An attempt was made to save him by repeated small doses of glucose and insulin, without result The blood sugar twelve hours before death was found to be 0 6 g /100 c cm in spite of the insulin Death occurred on the 53rd day

The findings in the pancreas were simple, in that no islet tissue could be found, while the acinar tissue was undisturbed There were small areas of atrophy and others of dilated tubules in the kidneys, but the greater part of the renal parenchyma was normal

No 7 developed polyuria with glycosuria on the 12th day, increasing till the 19th when the output was 40 c cm with 4% of glucose Albumin was also present Injections of protamine zinc insulin were commenced and carried on with gradual increase up to three units per day On the 35th day the urine was sugar free Insulin was discontinued and polyuria and glycosuria returned (35 c cm with 4 8% glucose) The rat ate excessively but irregularly and was inclined to

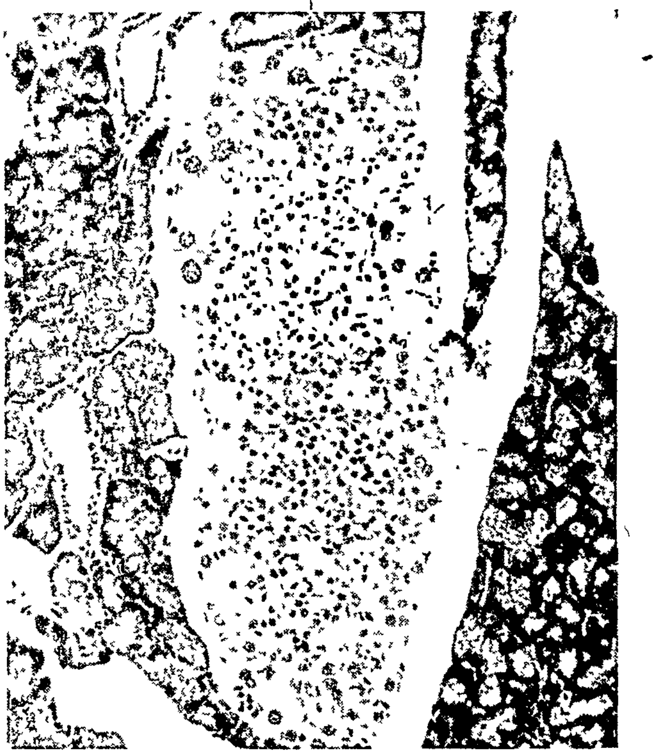

Fig 3—Large islet from rat No. 2 showing necrosis of central cells and peripheral zone of hypertrophic α-cells. (× 175.)

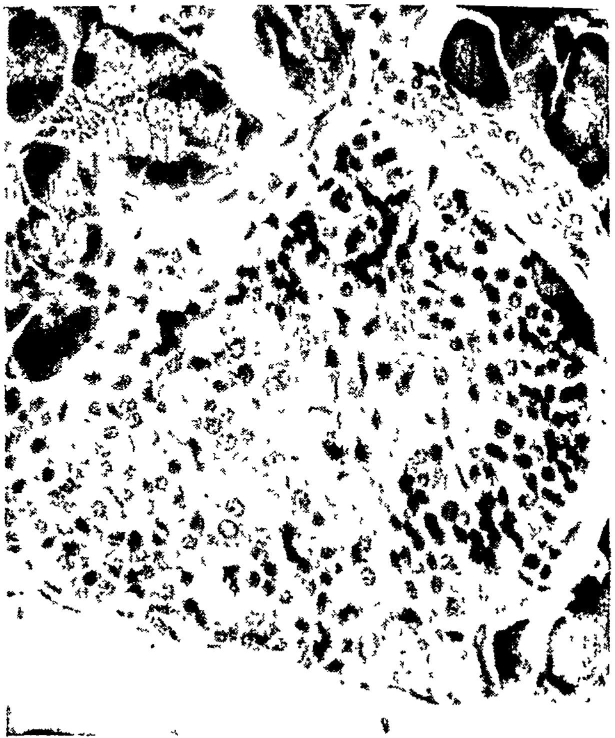

Fig. 4—Islet from diabetic rat No. 7. The cells are disordered in arrangement, the central ones being enlarged and the peripheral ones smaller than normal. (× 350.)

drowsiness. In the period following, though glycosuria was never absent, the animal's condition improved and it gained weight. Albuminuria disappeared. It was in good condition when killed on the 70th day. At this time the blood-sugar was 0·18 g./100 c.cm.

In the pancreas of this animal the islets were not clearly diminished in number, and many were of fairly large size, so that it would be hard to say that there was quantitative reduction of islet tissue. The islets themselves were abnormal in structure; the central cells were mostly large and polygonal or rounded, and were not arranged in natural ribbons or trabeculæ: their protoplasm was sometimes pale, almost vacuolated. At the periphery of the islets the cells had abnormally small bodies, so that the nuclei appeared closely packed (fig. 4). The general appearances as compared with the normal (fig. 1) suggested reparative change following upon damage of cells.

No. 6, dosed similarly to No. 7, developed glycosuria at the same time and was killed three days later, on the 14th day. Its weight had fallen from 240 to 185 g. The pancreatic islets were abundant and cellular, and no necrotic cells were seen in them. The arrangement of their cells was frequently disturbed and there was lack of uniformity in size, while some of the larger cells showed pallor in staining of protoplasm with diminished granularity but without vacuolation. These changes appeared to be reparative and to be residua of earlier acute lesions now practically healed.

No. 13.—This rat developed persistent glycosuria on the day after the first injection of alloxan. It showed no sign of illness and continued to feed well and to increase in weight. The second and the third injections caused no alteration of signs or symptoms and the urinary volume throughout remained about normal. From the 37th day the glycosuria diminished, and by the 39th it had disappeared, remaining in abeyance until the animal was killed on the 42nd day. In this case the amount of islet tissue in the pancreas appeared to be little short of normal, but there was definite evidence of old damage. Some of the larger islets, normally sharply oval, were partially collapsed and distorted in shape. Most of the islets were of fairly normal structure, but there was irregularity in size and shape of their cells, the central ones being larger and the peripheral ones smaller than normal. In three places a small irregular space, empty but for a few fibrillar strands and one or two capillaries, was observed among acinar tissue: these appearances, never seen in the pancreas of the normal rat, were thought to represent the sites of islets which had been destroyed in the acute phase.

DISCUSSION

The acute experiments show that alloxan produces specific damage of the islets of Langerhans in the rat, just as it does in the rabbit. In rats, after single subcutaneous or intramuscular doses, the destruction of islet cells has been less complete than in rabbits dosed intravenously (Dunn et al. 1943). The effects, however, vary in individual animals and it is probable that complete destruction of some islets can occur in the acute phase. The few observations that we have made on blood-sugar changes confirm the development of hypoglycæmia just as happens in the rabbit.

It is clear that most other tissues of the body, including as a rule the exocrine pancreatic tissue, are little if at all affected. No alterations have been recognised macroscopically or microscopically in liver, thyroid, thymus or pituitary. Sometimes in the acute phase there has been some congestion of the suprarenals, but microscopy has revealed no substantial cellular changes. The only other organs which have sometimes been seriously affected have been the kidneys. In some rats there has been fairly extensive necrosis of tubules, possibly determined by concentration in them of alloxan or one of its products to a toxic level. Where this renal lesion is severe it may contribute seriously to the illness of the acute phase. On the other hand, it can be very slight at the early stage, and the later experiments show that where it has occurred healing takes place. Hence it is probably of little account in the diabetic phase, and adaptation of experimental procedure may make it possible to damage the islets without damaging the kidney.

The course of events in the rats described as diabetic realises to some extent the theoretical probability that one form of diabetes should ensue upon extensive damage of the pancreatic islets. In our attempt to produce glycosuria there were no failures: the five rats mentioned, and one other not reported because of a rather complicated history, represent the whole batch that were put to this test.

The severity of the disease varied. No. 13 though glycosuric from the start, showed almost no other sign of diabetes and had apparently recovered completely in a month. No. 7 had a more severe illness with polyuria and polyphagia, but had almost recovered in 70 days. Nos. 3 and 5 were very different, for glycosuria, polyuria, polyphagia and polydipsia were outstanding features easily observed at almost any moment of the day or night for long periods. No. 5 ended up characteristically with severe acetonuria, emaciation and coma, while the blood-sugar had risen to at least 0·6 g./100 c.cm. No. 3 would almost certainly have died shortly in the same

tinuance, was established in two experiments, Nos. 3 and 7. This in conjunction with the islet lesions seems to prove that the glycosuria was due to lack of insulin; but unfortunately systematic observations on the blood-sugar could not be carried out.

In all instances abnormality was observed in pancreatic islets. In Nos. 6, 7 and 13 the changes, though definite, were comparatively mild and represented healed or healing stages with replacement of cells. In Nos. 3 and 5 on the other hand, proportionate to the severity of the symptoms, the islets had suffered complete disaster with little or no sign of attempts at repair. From these two experiments one fact emerges which may have significance for future interpretation of pancreatic changes in human diabetes—namely, that some islets may be destroyed leaving no trace. This was observed also in the rabbit as early as five days after a single dose of alloxan (Dunn et al. 1943). While the changes in the human pancreas in diabetes are very variable and the amount of islet tissue is notoriously difficult to assess, cases occur where there appears to be diminution in number of islets and there is nothing to indicate whether the islets have been deficient naturally or whether they have been in part destroyed. At this stage, however, there is no need to attempt any close comparison between the pancreatic lesions in this artificial disease produced by an acute onslaught in the course of a few weeks, and in human diabetes which from an insidious onset may have lasted for years. We have seen for example none of the more characteristic islet changes described in the human disease—sclerosis or hyalinisation of islets, or hydropic changes in their cells. The experiments are few and of comparatively short duration, and by more extensive investigations a wider range of pathological phenomena may be brought to view. The essential purpose of this paper is to show that the islets of Langerhans can be selectively damaged by a chemical substance conveyed to them by the humoral route, and that in consequence a lasting glycosuria can be established in animals which are maintained alive.

SUMMARY

Alloxan, in doses of the order of 300 to 400 mg. per kg. body-weight introduced subcutaneously or intramuscularly in rats, usually caused severe acute damage of the islets of Langerhans in the pancreas. In some cases, though not invariably, there was also necrosis in renal tubules.

In five rats which survived a series of doses, glycosuria developed. Two of these animals exhibited almost all the signs and symptoms of severe diabetes mellitus. A third had symptoms of moderate severity and appeared to be recovering after two months. The glycosuria could be abolished by injections of insulin. Pathological alterations of varying severity, but extreme in two cases, were found in the pancreatic islets in these diabetic rats.

We have much pleasure in acknowledging our indebtedness to Dr. E. Duffy for blood-sugar estimations, to Mr. J. Kirkpatrick for photomicrographs, and to the works department of the University of Glasgow for making metabolic cages at short notice. The work was supported by a grant from the Rankin medical research fund of the University of Glasgow, and continuation of it has received generous assistance from the Medical Research Council

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TUBERCULOSIS AT A CHILDREN'S HOSPITAL

AN ANALYSIS OF CASES

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THE following is an analysis of cases of tuberculous infection admitted to the Hospital for Sick Children, Great Ormond Street, during the first 6 months of 1942. The recent report of the Medical Research Council on tuberculosis emphasises the increase in the number of cases of infection in children under 5 years. This is borne out by the following figures which show how the pædiatricians are encountering the results of spread of tuberculous infection during the first years of the war. The return of active cases of phthisis from hospitals and sanatoria to homes where there were young children, the crowding and unhygienic conditions of shelter life during the blitz, and the evacuation of children to the country where they were exposed to the possibility of an infected milk-supply or to other unrecognised sources of infection, are among the factors which have led to the increase of tuberculosis in children. This analysis does not claim to raise any fresh points in the epidemiology of tuberculosis. It is an attempt to emphasise the seriousness of the position as regards childhood infection seen from the pædiatric standpoint.

The number of cases of tuberculosis relative to the total number of admissions for the first 6 months of the years 1938 and 1942 were as follows :

	Total admissions (medical and surgical)	Cases of tuberculosis	%
1938	3552	75	2·11
1942	2184	65	2·98

Owing to war-time conditions, very few beds were available at the hospital, so for 1942 (January to June) the total admissions to the two base hospitals and to Great Ormond Street were taken as being comparable *to the admissions in 1938 (January to June). Cases of* tuberculous infection in 1942 represented 2·98% of the total admissions as compared with 2·11% in 1938, being an increase of 41%.

TABLE I—DISTRIBUTION OF VARIOUS TYPES OF INFECTION

Type of infection	*1938*	*1942*
Miliary infection	9	15
Pulmonary infection—	12	23
Pleural effusion	3	8
Epituberculosis	..	4
Hilar enlargement	..	5
Unclassified	9	6
Abdominal infection	7	6
Bone infection—	22	7
Spine	10	5
Hip	8	1
Knee	2	1
Ankle	1	..
Dactylitis	1	..
Kidney	1	..
Cervical adenitis	24	14
—	75	65

In table I the distribution of cases between the various types of infection is analysed. The increase in the number of cases of miliary infection from 9 to 15 is remarkable, and there is also a definite increase in the number of cases of pulmonary infection, particularly of pleural effusions. The high incidence of bone infections in 1938 may be partly accounted for by the fact that many more chronic cases were admitted then that in 1942, where admissions were largely limited to acute cases.

In table II the cases admitted in 1942 are analysed further. Of the 65 cases, 15 were found to have miliary tuberculosis, 4 of them being over 1 years of age, the other 11 having an average age of 9 months. There were 2 babies of 3 months, both with a definite history of contact. Most of these babies with miliary infection *were brought to hospital on account of general ill health* and failure to gain weight. A few cases gave a history of cough. Others, known to have been in contact with adult infection, were either sent by a private doctor or brought by anxious parents for radiological examination. A few cases were actually admitted on account of meningeal symptoms. One of the older children was a girl of 8 with chronic miliary infiltration of both lungs shown radiologically. She subsequently developed a pleural effusion, but was still alive 12 months after radiological diagnosis. The other 14 cases died within a few days or weeks of admission, all of them showing terminal meningeal involvement. Of these 15 cases, 8 gave a positive tuberculin reaction, 3 a definite negative reaction and in 4 cases the result is unfortunately not recorded ; 6 cases gave a definite history of contact.

TABLE II—ANALYSIS OF CASES ADMITTED IN 1942

Type of disease	Cases	History of contact	Tuberculin reaction	
			Pos.	Neg.
Miliary	15	6	8	3
Pulmonary—	23	..	17	..
Pleural effusion ..	8	1	8	..
Epituberculosis ..	4	2	4	..
Hilar enlargement ..	5	1	5	..
Unclassified	6	..	..	..
Abdominal tuberculosis ..	6	..	6	..
Spinal caries	5	1	..	1
Hip	1	..	1	..
Knee	1	..	1	..
Cervical adenitis	14	..	3	..
—	65	11	36	4

There were 23 cases of pulmonary involvement other than miliary infiltration. These were 8 cases of pleural effusion, one of which had erythema nodosum as the presenting symptom. The others gave a history of pain in the chest, cough and malaise after a " cold " or acute febrile attack. There were 4 cases of epituberculosis shown radiologically, the presenting symptom again being general ill health and cough following an acute fever or " cold " ; 5 other cases, 2 of which showed erythema nodosum were found to have enlarged hilar shadows. There were 6 cases which are not classified, but they were almost certainly cases of epituberculosis. Of the 23 cases, 17 of which gave a positive tuberculin reaction, only 4 give a history of contact. Most of these pulmonary cases were referred for sanatorium treatment, a few with suitable homes were advised long convalescence with periodic observation, and removal from contact, if present.

Abdominal tuberculosis was present in 6 ; 5 were found to have distended abdomens with a palpable mass of glands, and omental involvement. The 6th presented symptoms of subacute obstruction, necessitating operation. All 6 cases showed a positive tuberculin reaction and none gave a history of contact ; 1 gave a history of a questionable milk-supply. These cases were treated with long convalescence or sanatorium treatment and when last heard of were making good progress.

Only 6 cases of tuberculosis of bone were seen ; 5 of these were cases of spinal caries. One gave a definite history of contact but showed a negative tuberculin reaction. They were all referred to an orthopædic centre for treatment. There were 2 cases of tuberculous arthritis, one of the hip and one of the knee. Both gave positive tuberculin reactions. Of 14 cases of tuberculous cervical adenitis, 3 tested for tuberculin reaction were all positive ; the other 11 unfortunately were not tested, but the diagnosis rests on the opinion of an experienced observer and seems to have been borne out by the subsequent course of the disease. None of these cases gave a history of contact or of a questionable milk-supply.

Of the 65 cases 17% gave a definite history of contact. It is perhaps significant even in such a small series that 6 of these " positive contact " cases occurred in the group with miliary infection, 5 of them in children of under 15 months of age, a point which emphasises the serious results of infection in the early months of life.

I was struck in taking these histories by the ignorance of the parents of the risk of infection. A way should be found of educating the public in the danger of allowing young children to come in contact with cases of active tuberculosis. It is surprising how often the parents are unaware of the risk. A remote grandparent with phthisis, who died many years before the birth of the infected child is often cited, whereas the neighbour with a slight hæmoptysis who shared the air-raid shelter is ignored as a possible source of infection. Much could be done by education in tuberculosis dispensaries and health centres to enlighten the public about contact.

My thanks are due to the staff of the Hospital for Sick Children, Great Ormond Street, for access to the notes and permission to publish these cases.

Reviews of Books

Embryological Treatises of Fabricius

HOWARD B. ADELMANN. (Cornell University Press. Pp. 883. $12.)

Harvey constantly admitted his debt to the Italian anatomist, Hieronymus Fabricius of Acquapendente, whose demonstration of the valves in the veins, he said, led him to formulate his own conception of the circulation of the blood. It is difficult to award Fabricius his true status among his peers. He succeeded two great anatomists—Vesalius and Fallopius—in the chair at Padua and owed much to the tradition of the first and the patronage of the second. His writings were for the most part published late in his life, long after he had become famous for his lectures and demonstrations, which attracted to Padua students from all the European countries. Professor Adelmann whose labours on Fabricius are enshrined in this monumental volume, sets out brilliantly the state of knowledge in the sixteenth century, the position of the University of Padua as a centre of learning, and the life and manners, quarrels and controversies, of a man who whatever his standing in the eyes of posterity was certainly not lacking in self-appreciation. He has also translated and profusely annotated two of the treatises of Fabricius—on the formation of the egg and the chick and the formed fœtus. Copies of the original illustrations and a good index make this a memorable publication.

After-Care and Rehabilitation

Editors : SIR HUMPHRY ROLLESTON, Bt., MD CAMB., FRCP ; ALAN MONCRIEFF, MD LOND., FRCP. (Eyre and Spottiswoode. Pp. 128. 8s. 6d.)

THIS ninth in the series of *Practitioner* booklets is a useful guide to problems of aftercare and rehabilitation in a very wide range of conditions. Postoperative care is discussed from the medical, surgical, anæsthetic and psychological standpoints, and a series of articles deal with rehabilitation in acute medical diseases and pulmonary tuberculosis. A vigorous chapter by Dr. Geoffrey Evans is full of sound practical advice on measures for preserving general body function in patients confined to bed. The special problems of surgery—head injuries, fractures and amputations—are covered by recognised authorities clearly and concisely, and there is a final chapter on occupational therapy. The booklet is an authoritative and practical review of a topical subject.

The Metabolism of Fat

IDA SMEDLEY-MACLEAN, MA, D SC, FIC, biochemical department of the Lister Institute of Preventive Medicine. (Methuen. Pp. 104. 5s.)

THE author of this little book is an acknowledged expert in the subject, and it is a pleasure to read her simple but lucid account of the way the fats are broken down, synthesised and oxidised in living organisms. The constitution of the lipins and the absorption and transport of fat and fatty acids also receive attention. The text is clarified by an abundance of structural formulæ. Within the space at disposal no-one could have treated the subject in an exhaustive way, but she has made up for this by giving a list of references covering every chapter, not only to the latest publication in English but to the best of the papers in all languages during the last 40 years. Teachers and advanced students will find this little book very useful, and biochemists and physiologists could do with a great many more of its kind.

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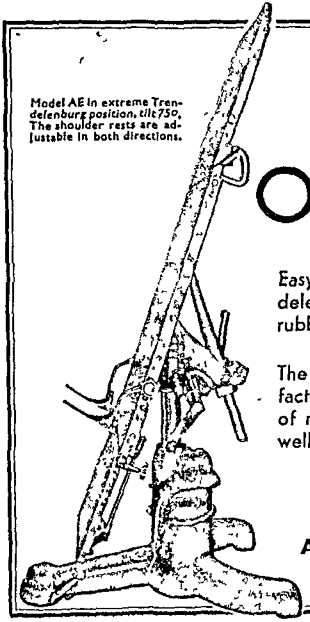

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[1] *J. Amer. med. Assoc.* (1941) 117, 1496.

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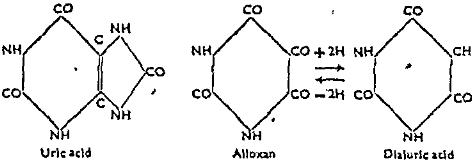
THE LANCET

LONDON: SATURDAY, SEPTEMBER 25, 1943

EXPERIMENTAL DIABETES

ALTHOUGH it is 42 years since **OPIE** localised in the islets of Langerhans the pathological changes associated with diabetes mellitus we are still far from understanding the origin of the degenerative changes that may lead to this disease. In 1922 **ALLEN**[1] found that dogs deprived of a large part of their pancreas might remain non-diabetic while on a diet low in carbohydrate, but sometimes developed fulminating diabetes when more carbohydrate was added to their food. Such a diabetic condition was associated with changes in the islets, the most striking of which was hydropic degeneration, and **ALLEN** believed that this was demonstrable in the human pancreas whenever the diabetic symptoms had been intense and prolonged. Others have observed it only rarely, but according to **ALLEN** this is because their cases were mild or because post-mortem changes made identification difficult. More recent work[2-5] has shown *that in animals rendered diabetic by administration* of anterior pituitary extract the chief early changes in the islets are degranulation of beta cells, with hydropic degeneration in some of these cells, and mitotic activity in some islets. Later the principal abnormalities are beta-cell degranulation, reduction of islets to small groups of alpha cells, and gross hyalinisation of the islets; in some instances[3] the beta cells seem to be selectively replaced by hyaline material. Hyaline changes are now generally considered to be the most characteristic pancreatic lesion in human diabetes mellitus[6] and the state of the islets in animals with long-standing diabetes induced by a short series of pituitary injections may be regarded as analogous *with that in human diabetes.*

In the past few months **SHAW DUNN** and his colleagues[7,8] have shown that intravenous administration of alloxan to rabbits can cause acute necrosis of almost all the islet tissue of the pancreas. A single injection is followed by an initial rise in blood-sugar level, giving way to a profound fall which sometimes ends fatally; and subsequently almost all the islets are found to have undergone necrotic changes. In our present issue **SHAW DUNN** and **McLETCHIE** provide the logical sequel to these observations by showing *that, when, islet lesions are induced in the rat by* giving a series of injections of alloxan the animal develops hyperglycæmia, glycosuria, and often the cardinal symptoms of a persistent and severe diabetes mellitus. These findings are obviously of great importance; but it must be confessed that their physiological significance is not yet clear. *Alloxan* is a simple condensation product of urea and mesoxalic acid, and is commonly prepared in the laboratory by the oxidation of uric acid with strong oxidising agents such as dilute nitric acid:—



Alloxan is easily reduced to dialuric acid, which can itself be oxidised to alloxan, and at one time it was thought that such a pair of compounds might provide a biological oxidation-reduction system. Although this remains to be proved, it is perhaps noteworthy that the easily reduced *and biologically important* substance riboflavin is a complex derivative of alloxan. The hypoglycæmic action of alloxan was reported by **JACOBS**[9] in 1937, but apparently he did not examine pancreatic tissue from the rabbits he treated, and the Glasgow discovery that alloxan affects the islets was wholly unexpected. The observation was made in the course of an investigation of the pathogenesis of the crush syndrome: alloxan was tested for its action on the kidney because it was deemed to be a possible biological oxidation product of uric acid, and recognition of its action on the islets of Langerhans followed the finding that rabbits sometimes died in convulsions a few hours after receiving a single intravenous injection.

In **SHAW DUNN**'s animals we have the first example of a diabetic condition in which the death of the islet cell can be observed, so to speak, on the table. The rapidity with which a selective necrosis can take place is one of the most striking facts now brought out. Taking into account the hypoglycæmic phase, **SHAW DUNN** and his colleagues suggest that alloxan *stimulates islet activity, and that the cells finally* fail and undergo necrosis because they have been overdriven. They discuss the possibility that alloxan *may be formed in the body under physiological* conditions, and act as a muscle hormone in regulating islet activity, and they refer to it as a possible cause of an initial disturbance of the islet system which may eventuate in diabetes mellitus. But it is perhaps unnecessary to assume a physiological stimulation of the insulin secretory mechanism in order to explain the observed facts, and the importance of the new observations does not depend on the validity of such speculations, interesting though they are. Certainly the histological picture of the islets is very different from that of the pancreatic remnant in **ALLEN**'s partially depancreatised dogs, in which the degenerative changes were attributed by **ALLEN** to overstimulation, a *conclusion recently supported by* **BEST**.[10] The hydropic degeneration and degranulation in the beta cells which follow administration of *diabetogenic pituitary extract to dogs are likewise* ascribed by **BEST** and his colleagues[11] to overwork, but **HOUSSAY**'s team[12] concludes that the pituitary extract directly induces degenerative changes in the islets, and that hyperglycæmia produced by other means aggravates the lesions arising from this direct

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[7] Dunn, J. S., Sheehan, H. L. and McLetchie, N. G. B. *Lancet*, 1943, i, 484.

[8] Dunn, J. S., Kirkpatrick, J. and McLetchie, N. G. B. *J. Path. Bact.* 1943, 55, 245.

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[11] Best, C. H., Campbell, J., Haist, R. E., Ham, A. W. *Ibid*, p. 17.

[12] Houssay, B. A., Foglia, V. G., Smyth, F. S., Rietti, C. T., Houssay, A. B. *J. exp. Med.* 1942, 75, 547.

action. Most other workers have assumed that the islet damage is more likely to result from overstrain due to a high blood-sugar level, but HOUSSAY, by continuous intravenous infusion of glucose has maintained the blood-sugar of normal dogs for four days at the level found in dogs made diabetic by daily injection of pituitary extract, and he says that their islets showed none of the lesions seen in the pituitary-treated dogs; the beta cells were hyperplastic rather than degenerate and there were signs of hyperfunction. He concludes that the pituitary extract must have a direct action on the islet cells which is not mediated by hyperglycæmia. The nature of such an action is not at all clear, but the observations of SHAW DUNN on the extraordinary action of the simple substance alloxan may well offer a new approach to this problem, and ultimately to the problem of the genesis of human diabetes mellitus.

WHAT MONEY CAN BUY

"Do you consider that a patient's financial status should have any bearing on the treatment available?" This rather awkward question is one of eight put to the inhabitants of Eastbourne by the local branch of the BMA. The answer, on the face of it, is No. If Parliament decides on a national medical service, financed by compulsory contributions and taxation, that service, one would say, cannot possibly offer an inferior kind of medical care to citizens who happen to be poor, or a superior kind to those who happen to be rich. In any national service the governing principle must surely be "To each according to his needs" without regard to his capacity to pay. Nevertheless the object of the new service is to improve the care of the majority, not to make things worse for the minority—to level up, not to level down. To provide precisely similar care for everyone would mean that some people got much less attention than they now command. In our last issue Dr. W. N. LEAK denounced as medically unsound the idea that all can be treated alike. "Can you suggest any reason," he wrote, "why those who are accustomed to a higher and more comfortable standard of living should have their time of sickness made into a time of acute physical and mental discomfort as well?" Most of us will agree that a medical Utopia will not be built by forcing Lady A from Belgravia into a bed next Mrs. B from Pimlico; though it would doubtless be good for both if the position could be achieved voluntarily. If then we accept the anomalies of the social structure as we find them, does this mean that financial status should after all have a bearing on treatment—that a superior kind of medical care should be sold to those who can afford it?

Earlier this year, discussing Privileges in Hospital, we expressed the opinion that, at least for a transitional period, extra comforts should be purchasable in hospital, so long as this is not to the detriment of the purchaser or his fellow patients. Thus the well-to-do should be allowed to rent private rooms attached to hospital wards, provided these rooms are not wanted by others with a *medical* claim to privacy. (This claim must be strictly enforced; in the past medical need has been by no means as sure a passport to privacy as is money to pay.) Hospitals onging to a national service will presumably free to erect private wings where those who wish it can be accommodated either in return for a weekly rent or as contributors to a voluntary saving scheme. Two conditions, however, are important. First, the existence or prospect of pay-beds must not prejudice improvement in the ordinary wards of the hospitals. Secondly, contributory schemes covering extras such as private accommodation must not be extended to cover essentials of any kind. In a comprehensive service all the essentials will be paid for by compulsory contributions or taxes: the sick person will have a right to all necessary hospital treatment without extra payments or contributions to other funds. It is true that Sir WILLIAM BEVERIDGE proposed that hospitals should be entitled to charge him a "hotel fee" of about 10*s.* a week; but this is merely to remove the part of the sickness benefit that would otherwise be spent at home. It may be that the voluntary hospitals will seek to convert the hotel fee, which is simply intended to prevent patients from making a profit out of social insurance, into a real maintenance charge, either to augment their incomes directly or to justify their continuing their contributory schemes. But any such arrangement must be resisted, for it would destroy one of the main principles of the Beveridge plan. The sick person, called upon to pay perhaps half or three-quarters of his insurance money in return for hospital treatment, would no longer be free from want, and all the financial anxiety associated with sickness would return. If ordinary hospital saving schemes go on, the whole conception of a single all-embracing insurance contribution will have been lost. In a comprehensive service the only legitimate function of saving schemes is to supply extras.

Privacy is not the only advantage at present enjoyed by the affluent when they fall ill. Besides private rooms, money can buy doctors' time in almost any quantity, and people accustomed to this privilege will naturally resent any attempt to ration medical attention. To meet this difficulty it has been suggested that patients who think their ration inadequate shall be able to pay the family doctor or the specialist a fee for seeing them "after hours"; beyond the bare essentials that are their right they would be permitted to purchase extras in the form of further examination, leisurely heart-to-heart talks, and explanations at length to relatives. This proposal is objectionable if it implies that full examination and full explanation are not essentials of a complete service: in our view they are part of Basic Medicine and not extras at all. Similarly a second opinion, when necessary for the patient's peace of mind, is a normal part of medical care. It is only when the demands of patient or relatives become unreasonable that the question of payment should arise: here the consultation is truly an extra, and a fee might well be paid for it. Such a fee, however, ought not to be paid directly to the doctor who gives the additional attention: a national service should include no mechanism by which a patient pays his doctor privately; otherwise it will look as though money could really buy a superior kind of medical care. Today unfortunately the public tends to believe that doctors have two standards—one for the panel patient and another for the private patient who pays them fees directly. There may be little enough justification for this belief, but it would be well if the structure of any new service gave it no chance to persist. Like lawyers, we must pursue not only justice but also the appearance of justice. Like lawyers, we have some way to go.

INTRAPERITONEAL SULPHONAMIDES

THE introduction of sulphonamides into the peritoneal cavity has become a recognised adjunct to abdominal surgery. The animal experiments and clinical experience of HUDSON and his colleagues[1] demonstrated the efficiency of intraperitoneal sulphanilamide in reducing mortality in early peritonitis, and established a workable technique. From the results in a controlled series they were satisfied that implanting the drug at operation was more effective than giving it by mouth or vein. Sulphanilamide is readily absorbed from the peritoneum, and a single implanted dose produces a therapeutically effective blood-concentration for a few hours only, but the concentration in the peritoneal exudate falls much more slowly[2]; thus it may be as high as 300–800 mg. per 100 c.cm. forty hours after operation. It is therefore possible by this route to maintain a very high local concentration of the drug without reaching a toxic level in the blood. But there is one hole in this argument; intraperitoneal sulphanilamide produces a concentration in the portal vein some 40% higher than in the blood-stream, and this probably explains the liability of large intraperitoneal dosage, supplemented by venous or oral administration, to produce hepatitis; thus JACKSON and COLLER[3] reported 9 cases of non-fatal jaundice in a series of 29 patients. So sulphonamides cannot be scattered about the abdominal contents regardless of dosage—if liver damage is to be avoided it is wise not to exceed a dose of 15 grammes.

Since the effect of intraperitoneal chemotherapy does not depend on the concentration attained in the blood, there is an obvious argument for using a compound less soluble than sulphanilamide—one which, being slowly absorbed, will maintain a high and long-lasting local concentration without raising the level beyond safety in the portal vein or blood-stream. Besides which, other compounds are more powerfully bacteriostatic and reach a wider range of organisms. Surgeons have therefore not been content to remain faithful to this one drug, though a MRC committee[4] still consider it the drug of choice. GARDINER[5] of Aylesbury uses sulphapyridine, and in spite of forebodings from other workers has had satisfactory results, with no trouble from adhesions, in 15 cases of perforated appendix given 10 g. of sulphapyridine intraperitoneally at operation. Others have used sulphathiazole and sulphadiazine, and in this issue PULVERTAFT describes animal experiments with the intraperitoneal insertion of sulphasuxidine. The new drug slowly breaks down into sulphathiazole, thus acting as a reservoir with no risk of producing a toxic blood-level. For clinical use PULVERTAFT recommends a microcrystalline form of sulphasuxidine. CRUTCHER and his colleagues[6] have contrasted the effect of these two drugs and sulphanilamide when introduced as a fine powder, a suspension or in lumps. In dogs the lumps often remained unchanged for days or even weeks and led to a local

days, and a lump of sulphadiazine 20 days after its introduction. Sulphanilamide disappeared rapidly in all dogs but one. The powder and suspension, besides being more thoroughly absorbed, produced *much less local reaction and adhesions*; in these respects sulphanilamide was the best and sulphadiazine the worst of the three. The drug, then, must be spread thinly, preferably in the form of a suspended powder or microcrystals; in lumps it may do more harm than good, and a fine dry powder is particularly apt to form lumps. Opinions differ on the question of adhesions, but chemotherapy will control infection, which with trauma is the main factor in producing them. The reported case of tetanus following intraperitoneal implantation of sulphapyridine reminds us that the sulphonamides are not antiseptics; in powder form they are not self-sterilising and can readily carry contamination from their containers or applicators. The difficulties of sterilisation have now been largely overcome—the MRC memo describes large-scale and small-scale methods—and only sterile preparations should be used within the peritoneum.

In the early days HUDSON and SMITH suggested that supplementary chemotherapy by mouth or injection might help to keep up the intraperitoneal concentration, and GILCHRIST and his co-workers[7] have confirmed this. A combination of routes should improve results in the more advanced cases of peritonitis and control the postoperative pulmonary and renal infections which an intraperitoneal dose does not check. It may be wise, however, to delay supplementary dosage for some hours after operation, in order to avoid a toxic concentration in the portal circulation. GILCHRIST suggests the following programme for perforation of the gut in a battle casualty:

> As a first-aid measure, 0 5 g. of sodium sulphathiazole per
> intravenously in a 5 or
> ake from 2 to 4 minutes.
> should follow. As an alternative, a soluble drug or a suspension of sulphathiazole microcrystals may be injected directly through the abdominal wall, or in some cases through the entry wound.
>
> As soon as possible, laparotomy should be performed. At that time a relatively insoluble sulphonamide, such as sulphathiazole, should be placed in the abdomen. When soluble sulphonamides are used in the abdomen, additional drugs must be administered after 8 hours. When slowly soluble sulphathiazole is used in the abdomen, no additional drugs are needed for 24 hours.

The need for fluids must not be forgotten—an intake of 4½–6 pints a day is essential—and the urine should be kept alkaline to litmus, if renal complications are to be avoided. If the dosage, form and sterility of the drug are correct, intraperitoneal chemotherapy will reduce operative mortality and complications, its greatest use being in the early case of peritonitis or as a prophylactic measure when the peritoneum is known to be contaminated. But reliance must not be placed on these drugs to the disregard of general surgical principles, such as drainage, intestinal decompression, replacement of fluid and prevention of cross-infection.

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1. Hudson, R. V., Smith, R and Seible, F. R. *Lancet*, 1941, i, [illegible]
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4.
5. Gardiner, R. H. *Lancet*, 1942, i, 195.
6. Crutcher, R. R., Daniel, R. A. jun. and Billings, F. T. *Ann. Surg.* 1943, 117, 677.
7. Gilchrist, R. K., Straus, F. H., Hanselman, R., Drua, C. C., Lawton, S. E., Freeland, M. *Surg. Gynec. Obstet.* 1943, 76, 65?.

Annotations

THE RCOG AND CONSULTANT STATUS

It is now fourteen years since the youngest of our colleges began life modestly under the auspices of the Board of Trade. It has already proved its worth to the state, earned the royal status conferred on it in 1938, and but for the war would have by now received its charter. Although so young it claims wider responsibilities than its sister colleges, for it is representative of Scotland, Ireland and the Dominions as well as of England and Wales, and as a result today has a helpful finger in many plans. Sir William Fletcher Shaw, on the eve of retiring from the presidency which he has held since 1938, tells[1] how delegates from the RCOG sit on the BMA planning commission, on the representative committee which is discussing the Beveridge report with the Ministry of Health, and on the standing joint committee of the three Royal colleges through which suggestions for the training of consultants have been made. The principle that in the making of a consultant postgraduate resident training plays a part as important as examinations has now been generally accepted; that principle, he proudly remarks, was first laid down by his college, and he is anxious that in the immediate postwar period standards will not be lowered. There will be many vacancies for obstetricians and gynæcologists, but he urges the college, while arranging to train as many candidates as quickly as possible, to do so without sacrificing quality to the demand for quantity. It would be better, he feels, for districts which have managed up to the present without highly trained consultants to carry on a little longer, rather than to flood the country with half-trained men. Indeed in its report to the Goodenough Committee the college had affirmed its resolution as soon as possible after the war to increase its requirements for the MRCOG. A period of five years' postgraduate training was suggested as a condition of admission to the proposed register of consultants. But a man who had spent years with the Forces could hardly be expected to spend another five years of apprenticeship, and it was proposed that for the five years after the war obstetricians and gynæcologists should be accepted on the present MRCOG regulations provided that the period of service with the Forces added to the period of resident appointments made up five years altogether.

SUPPLY OF RADON

The council of the Medical Defence Union in presenting its annual report on Tuesday felt obliged to reaffirm its conviction that the potency of radiotherapy is so great as to require skill of a high degree if unnecessary damage to normal tissues is to be avoided. The ugly lessons were probably drawn from experience of the rather lighthearted use of X rays for minor skin affections, which had resulted in burns and other tiresome reactions. Litigation in such cases is particularly harmful because it may lead the public to believe that painful reactions are always a sign of want of skill whereas they may be inevitable in the effective treatment of malignant disease. In another branch of radiotherapy the use of radon has, under war-time conditions, largely taken the place of radium element. Despite its innocent appearance radon carries with it the same risks as radium and in January last the National Radium Commission and the Medical Research Council decided on the conditions that should govern the issue of radon prepared from radium at the centres under their control. The same principles have now been accepted by the London Hospital Radon Service and that of the Manchester Radium Institute. The radon centres will supply radon only to hospitals which have been approved by the Radium Commission, and not direct to individual clinicians. The Radium Commission will in the first instance approve for supplies of radon only those hospitals which have a properly equipped radiotherapeutic department, with a radiotherapist and a physicist as part of the staff, and which have a properly organised follow-up of patients treated by radiotherapy. Such hospitals must undertake responsibility for seeing that the radon is properly used, with adequate precautions against wrong dosage. Where members of the staff of an approved hospital carry out some of their work at other hospitals not able to comply with these conditions, they may obtain supplies of radon through the approved hospitals provided the radiotherapist there is satisfied that the radon will be efficiently used. A list of the 49 hospitals so far approved (London 17, Provinces 24, Wales 3, Scotland 5) is given on p. 400. The supply of radon in the immediate future has been further assured by the generosity of the British War Relief Society of America in maintaining the radon centre at the Middlesex Hospital under the direction of Prof. Sidney Russ. The centre was opened in January, 1941, with a donation of £5000 and last week Mr. Clarke H. Minor, president of the American Society, handed a further cheque for £1500 to the chairman of the British Hospitals Association.

THE FATHER OF COMPARATIVE ANATOMY

Edward Tyson, born in Bristol of a long line of Bristol worthies, scholar of Oxford and of Cambridge, anatomist of London and Fellow of the Royal Society, has at long last been made a real character in a full-length biography. The life of Edward Tyson, late though it may be in its coming,[1] is a triumph of the biographer's art. The work displays special knowledge, patient research and real sympathy on the part of the biographer, as well as the best technique of modern book-making. It would be natural to ask whether some Bristol biographer, or perhaps an Oxford man interested in the distinguished scholars of Magdalen and the school of anatomy of Oxford, or maybe a student of the early days of the Royal Society or the College of Physicians and of the medical history of London had lovingly undertaken the task; and whether the work had been published by the University of Bristol, Oxford or Cambridge, or by the Royal Society or the College of Physicians. Actually, the biographer is associate professor of anatomy in the Hahnemann Medical College of Philadelphia and the volume is published by the American Philosophical Society. This is to our advantage, if not much to our credit, for even if some British anatomist had possessed the special knowledge and the leisure to undertake the task he would have sought in vain for a British learned society with adequate resources to produce this valuable addition to the history of British biological science. A generation of medical men who studied anatomy before the Berlin Anatomical Society had decreed eponymous nomenclature to be unscientific and British anatomists had meekly bowed to that decree, knew Tyson as a name and had some vague idea as to his period and nationality. They knew him as the discoverer of the glands then known by his name—glands that, strangely enough, he never himself described in any publication. Some knew him as the author who had described the "pygmie" and some knew that his description was, in fact, the first detailed account of the anatomy of an anthropoid ape. But few recognised him as "the Father of Comparative Anatomy in England and also the greatest of England's comparative anatomists, and among the greatest of all time anywhere" as Ashley Montagu declares him to have been. The picture he has painted of the man and his works suggests that this estimate is a just one. Edward

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[1] Report for 1942 of the council of the Royal College of Obstetricians and Gynæcologists: from the secretary, 58, Queen Anne Street, London, W.1.

[1] Edward Tyson, MD, FRS. 1650–1708. M. F. Ashley Montagu. American Philosophical Society. Pp. 488. $5.

Tyson was born on Jan. 20, 1650; it may be that one of the British institutions to which Tyson's association brought vicarious renown will make some recognition of the 300th anniversary of his birth, when the time comes.

A FILM WORTH SEEING

EVEN ten years ago a diagnosis of cancer of the lung was a death warrant. The fact that selected cases can now be saved by operation is at present of more academic than general importance; for it is a feat of surgery which few have so far achieved. A film of such an operation, made by the film committee of the British Council, displays the technique in a way, and through a medium, which will inform a wide medical audience of the possibilities of the method; and this, in the long run, will mean a greater chance of successful operation for the patient with carcinoma of the lung.

On Sept. 14 this film—"Surgery in Chest Disease"—was shown to a medical audience at the Curzon Cinema, London. The photography and the illustrative diagrams were exceptionally good, and the story of the patient was told without sentimentalism—no mean feat. The sequence showing the exposure of the hilum, the dissection and division, in turn, of the pulmonary artery, the superior pulmonary vein, the bronchus and the inferior pulmonary vein, and finally the closure of the bronchus showed the skilful technique clearly; indeed, the assistant at the surgeon's elbow could not have seen the detail as well as the audience in the Curzon Cinema.

The film is the first of a series of medical films to be made by the council; they are intended primarily for overseas medical audiences. Surgeon Rear-Admiral Gordon-Taylor, who introduced the film mentioned some of the other activities of the medical panel of the science committee of the British Council. Besides publishing a monthly bulletin in four languages, and giving representative medical books and journals to overseas scientific institutions, they award scholarships to young medical workers from abroad who wish to study in Britain and arrange lecture tours abroad by British experts.

SHORTAGE OF DOCTORS IN UNITED STATES

BY the end of this year about 53,000 medical officers will be serving with the US armed forces. For the rest of the population, roughly 120 million, it is estimated that about 108,000 effective doctors will remain, of whom 84,000 are specialists and general practitioners, 15,000 public-health workers, and 8000 hospital residents and interns.[1] If distribution were equal there would be one general practitioner for every 1557 people, but in fact there is acute shortage of medical care in many towns and districts, especially where the population has risen sharply through the growth of war industries. A recent survey by the US Public Health Service showed for example that a Southern city which three years ago had 25,000 inhabitants had now some 70,000, served by 14 effective doctors and 4 dentists. The doctors could do little visiting and some refused night calls: for a dental appointment people had to wait 3½ months. At the same time there was a shortage of houses, food stores, restaurants, and laundry services, and it was not surprising that workers in the local war factories had absence-rates up to 11–16%. The only hospital contained 68 beds, of which 18 in the basement, reserved for negroes, were seldom used, because negro doctors were denied facilities. In this overcrowded community the medical profession was not in a position to cope with possible epidemics, and the same is true of many other cities. Left to itself, the situation throughout the country will grow no easier; for 80% of new medical graduates are absorbed by the army and navy, and to replace the 2500–3000 doctors removed each year by death there will probably be less than 1500 civilian entrants.

To protect their home population the American authorities have adopted not only temporary expedients but also a boldly progressive policy. The expedients include limitation of military recruitment of doctors to the 20 states that are relatively well supplied, the persuasion of practitioners to move to places that need them badly, and efforts to get over difficulties in the full employment of the 6000 refugee practitioners now in the states, only 2000 of whom are US citizens. The wider policy includes not only expansion of industrial health services, campaigns against venereal disease and prostitution, and a programme of mass radiography to discover cases of tuberculosis, but also (notwithstanding the rival demands of war) increased expenditure on sanitary schemes, on hospitals, and health centres—these last "usually providing clinics and 6 to 8 emergency beds." The USPHS aims at helping local authorities to organise cooperative use of doctors and facilities for greater efficiency wherever consent can be obtained. In one area the local profession opposed the building of a health centre because, they said, it pointed the way towards socialisation of medicine; they also opposed free immunisation of industrial workers by public health officials, on the ground that the workers were amply able to pay for injections and the like. But it is significant that, once a shortage of doctors is admitted, it becomes increasingly difficult to hold such views, even in a country so individualist as the USA.

FRUSTRATION AND FULFILMENT

THE promoters of the course of lectures at Caxton Hall that was announced in our last week's issue have in their title brought to a focus many lines of modern thought. The psychology of frustration and fulfilment should indicate the study of all that concerns man's happiness, individual and social, all his strivings, conscious and unconscious, rational or instinctive, and the reactions that follow the conflict between what instinct demands and what the needs of a social organisation may tend to deny. It should include the study of those personal problems whose elucidation by Sigmund Freud first showed the significance of inner conflict and its influence on emotion and behaviour, the study of education as a process in the adjustment of the child to the calls of an insistent world, and also, what is immediately most important, the search for a remedy for man's failure to achieve national and social stability. These requirements are admirably met by the different personalities of the speakers in this course, to each of whom is allotted four lectures—too few for the full consideration of so vast a theme but enough to provide a systematic exposition of some parts of it. To Miss Anna Freud will come the opportunity of showing how the work of her famous father offers an understanding of problems that in its absence would appear insoluble; Miss Rooker, with the advantage of years of experience, will deal more specifically with the practical application of general principles to education; whilst those who would welcome wise counsel applicable to the difficulties looming ahead of us should find it in Professor Macmurray's talks on social sources of frustration and fulfilment.

FOR gallant and distinguished services in North Africa the OBE has been awarded to Lieut.-Colonel H. T. Chiswell, LMSSA, RAMC, and to Lieut.-Col. R. A. King, MB LOND, RAMC.

". . . Bureaucracy is a well-worn word. I wonder how many times it was used in 1911. I [illegible] means an over-complicated [illegible] ernment are [illegible] to strangle and inhibit progress in one of the greatest professions of the human race—the profession of medicine."—The MINISTER OF HEALTH, speaking at Cardiff on Sept. 14.

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[1] [illegible] . Doctor Shortage [illegible] Sept. 4 by the

Special Articles

DERMATITIS FROM CUTTING OILS

G. P. B. WHITWELL, M D LOND
WORKS MEDICAL OFFICER

OIL and alkalis are two of the most important causes of dermatitis in industry, and at present cutting oils and similar liquids form an especial interest owing to the great quantities used.

The problem of oil dermatitis and the underlying principles of prevention and treatment are simple, and if understood make of these common industrial rashes a nuisance rather than a menace; but if on the other hand a constant watch is not kept on the problem, there may be serious loss of production and unnecessary labour changes.

CUTTING OILS AND LIQUIDS

I have studied my cases with two ends in view—firstly to discover the type of rash, and secondly to correlate this with the cutting oils or liquids at fault. Cutting oils and liquids are used in engineering for several purposes. A jet of the liquid is projected on to the edge of the tool, grinding wheel, or some such part in order to prevent overheating, to preserve the tool (often an expensive item) and for several other reasons which have no medical interest.

The liquids chiefly used are the so-called soluble oils which are commonly called "suds," a name which probably dates from the days when this liquid was soap and water. Modern soluble oils vary in composition and in skin-irritating power, but are often emulsions of mineral oil along with a fatty oil which is saponified with an alkali. Wood-alcohol or ammonia may be present and sometimes an oil derived from coal is used instead of the petroleum-derived oil. A phenolic-type disinfectant is commonly added by the blenders. The neat soluble oils are diluted with water in varying proportions: perhaps 1 part of oil to 30 of water. The resulting mixture is usually milky but modern types of soluble oils may be translucent. If the added water is hard the oil vendors sometimes advise the addition of an alkali at about ½% strength, though water from a water-softening plant would be preferable. In hot weather the suds may decompose and the smell is offensive; to counteract this it is sometimes the practice to add more phenolic disinfectant; in our works one part of 'Izal' to 600 suds is used. It is easily seen, therefore, that suds may eventually become quite a battery of diluted chemicals, and although these dilutions are safe for occasional use, they easily produce irritation in those whose forearms and hands are wet all the long hours of the working day. It is possible that in the case of anthracene oils irritating chemicals may be derived from the coal. There is also one very important additional way in which suds may become hazardous: when contaminated with oil or paraffin which is carried on the component from a previous operation. Nevertheless a good soluble oil if used aright should give little trouble. We use two types in our works; one is described as having a "sulphur-naphthenic base," and is opalescent on adding water, the other has a "very high saponifiable content."

Another common type of cutting liquid is a mineral oil containing a varying amount of lard oil to which may be added colloidal sulphur, or a process of chlorination may be used. I have not seen much trouble from sulphurised oils so far; they commonly contain an oil-soluble disinfectant such as pine oil. More important from the medical point of view are the paraffin (kerosene) and mineral oil mixtures, or the paraffin and mineralised lard oil mixtures. These produce many rashes of all types and should not be used where there are suitable alternatives. It should be explained that the term kerosene (or paraffin) means in this paper the fraction which comes over after gasoline on distillation of crude petroleum: it is, in fact, the kerosene commonly used for lamp oil. These two groups of oils (the sulphurised and the kerosene-mixture types), of course, are used straight—that is without addition of water.

The skin reactions to all these cutting liquids are of two main types: follicular eruptions and eczematoid reactions. The first type is by far the commoner; a eczematoid reaction is by no means common in works, although a mild reaction is seen quite often. On the whole men favour the follicular reaction, and women the eczematoid.

FOLLICULAR ERUPTIONS

Chronic oil folliculitis (*oil acne*).—This occurs mostly in men; women are only mildly affected. The individual especially attacked is usually dark in complexion and having much body hair. The second factor may explain the comparative female immunity. The rash is not invariably confined to the extensor surfaces of the limbs, the site depending to a large extent on the machine and the job. Some machines throw oil on to the thighs, some mainly soak the arms, and of course the best way to get an oil rash is to wear oil-soaked clothes, not forgetting the rolled-up sleeves which are responsible for quite a lot of trouble. In all cases indolent papules form round the pilosebaceous follicles, and where the hairs are long (as on the extensor surface of the fore-arms) deep nodules form which suppurate. The papules once formed last a good many weeks. A fortnight's exposure can produce an oil rash in some workpeople, and by experimenting on a volunteer I find that a daily 8-hour application of oil-soaked lint to the thigh can produce papules in 2–7 days.

The comedo appearance so often seen is not essential to the clinical picture and depends on the cleanliness or otherwise of the oil; it is in any case quite dissimilar to the comedo of acne vulgaris for it appears to be more in the nature of a horny plug. When the oil acne is severe it is common to observe boils in the rash-bearing area, and until this occurs the rash produces but little symptoms. The final result of an oil papule is a pitted scar. Paraffin and mineral oil mixtures (or paraffin mixed with mineralised lard oil) are cutting liquids which produce most of our severe cases. From all other oils we do not get much oil acne. The addition of paraffin to any mineral oil seems to increase the follicular irritating property of that oil. As previously stated the suds may become hazardous and produce severe oil acne from an admixture of oils carried from a previous operation; in our works this specially applies to the carrying over of paraffin oil mixtures. Uncontaminated soluble oils produce a mild acne (without comedos) on the elbows and legs of female workers. Lard and mineral oils mixtures are also not specially hazardous, in my experience; the same applies to the engine lubricating oils which we use. I wish to stress that the mixing of paraffin with cutting oils is most undesirable for the operative.

Acute oil folliculitis.—This curious reaction is common in those who handle mineral oil and paraffin mixtures, or in those who swill engine parts in paraffin for degreasing purposes. I have not seen it where paraffin has not been present. The condition is a fine acute folliculitis, sudden in onset, occurring mostly on the flexor surfaces of the forearms, and sometimes the neck, chest, face, and legs, attended by much itching, and often reminiscent of sudamina. Like many industrial skin diseases it tends to occur in the hot weather. As the rash subsides there is some exfoliation of the skin. Whether this rash can be caused by pure paraffin I am not able to say—all our paraffin is contaminated to some extent with other oils, and unlike oil acne no pustulation occurs in this condition. Nevertheless it is possible that this acute folliculitis is a sort of acute oil acne in which the penetrative power of the paraffin plays a major rôle; the paraffin may carry minute traces of oil, or other matter, into the follicles. Published work on the subject of paraffin rashes is not extensive and I have traced no mention of any acute follicullitis due to paraffin. The question is complicated by the fact that the term "paraffin" covers a diversity of products. This is a pity, since paraffin causes much industrial skin trouble. A pruritus from paraffin (without rash) is common in those with delicate skins, especially if the paraffin is dispersed in fine droplets, as in freeing parts of paraffin, by means of a jet of compressed air. I find no published mention of this. It is possible too that our present-day paraffin is not of the same quality as in former days, but nevertheless paraffin, standing between petrol and the heavier oils as it does, possesses some of the quality of oil in its follicle-irritating powers, and can also occasion general erythematous and eczematous reactions like those seen with petrol.

ECZEMATOID REACTIONS

These may occur alone or be associated with an oil acne or acute oil folliculitis. The commonest type is where there are well-defined patches of catarrhal erythema, sometimes with an appearance of slight lichenification, which occur on the forearms and hands of female suds operators, especially in the cases where gloves are worn soaked with suds. Rarely does this erythema come to a frank vesicular stage, except that a mild dysidrosis of the fingers and ulnar border of the hand is sometimes seen as well as interdigital maceration. The forearms and sleeves of these girls often smell strongly of phenolic type disinfectant, and a mild defatting of the horny layers is observed.

Paraffin and paraffin oil mixtures cause a marked diffuse catarrhal erythema in some workpeople; this is often observed on the flexor surfaces of the elbows where the rolled-up sleeves are saturated. In a few cases vesicles appear on the forearms, and on legs if they are contaminated too, but this is only where the erythematous stage is longstanding or neglected. Dysidrosis of the fingers seems occasionally to be provoked by paraffin, but paraffin although irritant does not produce the marked defatting such as is seen with alkalis or fat solvents. Two or three cases of catarrhal erythema of the hands were attributed to sulphurised lard and mineral oil mixture, and one of the cases had previously had a suds rash, but in our works this type of oil is *elatively innocuous.*

Animal or vegetable oils are generally considered to e less productive of oil acne than the mineral variety, ut the former types of oil are not often used unnineralised. Nevertheless all oils are probably irritating o some extent, even olive oil which in the form of amphorated oil has frequently produced an oil acne on he chests of bronchitic infants; a condition formerly lescribed as the "grouped comedos of infants." Dernatologists sometimes ask whether one oil can be ubstituted for another, less toxic in industry. This annot often be done. The engineer chooses his cutting iquid to suit hi [illegible] heat is volved he will [illegible] oil to ounteract this; [illegible] important o preserve the edge of an expensive tool and in this case n oilier oil such as mineralised lard oil may be used. Iowever if a soluble oil produces much skin trouble it hould be discarded and another brand tried, for there re a great many varieties on the market.

TREATMENT AND PREVENTION

The principles underlying treatment are simple and he results good. Cases of oil acne and acute oil olliculitis respond immediately under supervision, to washing twice daily, with plenty of hot water and soap. This can be done in the works ambulance room under the eye of the nurse. The operative in practically all cases can remain at his work and continue to work in oils; improvement will often be rapid. Daily baths are excellent if the rash is extensive. No other treatment is necessary, although the rash may be rubbed with zinc ointment or some emollient grease. Lint dressings backed with 'Cellophane' or brown non-absorbent wool are useful and will keep out oil, but this is not always possible because some machines are dangerous if dressings are worn. Soap-and-water treatment is doubly valuable because it is propaganda for cleanliness.

Eczematoid reactions are in a different category altogether. Soap and w [illegible] grease will keep most ca [illegible] work and will cure them; [illegible] *a change to a dry job is necessary and the treatment is* the same as for eczema.

Prevention is important. Many cases of oil acne have no symptoms and do not often wash; they will therefore tend to overlook their rashes for some time. This can [illegible] la posters in the factory. [illegible] by the factory inspectorate [illegible] not sufficient propaganda [illegible] words and much colour is needed. Equally important is the attitude of the medical staff in attending to early slight rashes. Patients should be encouraged to come early. The factory doctor should make notes as to where his cases work. He will soon discover the black spots in a large factory; he may find that some machines have inadequate splash-guards. Protective clothing should be of synthetic rubber which resists oil and paraffin. Above all the work of the doctor will be largely set aside if the factory washing facilities are inefficient and unattractive. Herein lies the importance of not appointing old and infirm men to clean the wash-places. Many wash-bowls are too small; troughs and well-raised sprinkler-taps are better. Hot air drying is superior to towels, which get dirty.

Barrier protective creams are largely unnecessary but have a limited and occasional use for those who easily become chapped; there is no need to use fancy advertised preparations, and as much benefit is derived from some creams if they are used after rather than before work. In one large factory 960 lb. of clay soap preparation were used in one month and the incidence of skin trouble due to cutting liquids was serious. Operatives washed with it, used it for the treatment of an already present rash, and reapplied it with oily fingers. It was stopped for an experimental period of two months; the rashes had been declining and during this experimental period continued steadily to do so. In another comparable factory of half the size, 14 lb. of a lanoline-containing grease were used per month, and the rashes in this factory were negligible, most operatives using no protective cream at all. The use of barrier creams obscures the main issues which are cleanliness and the proper use and selection of cutting liquids; protective creams should be regarded as a weak second line of defence. These *remarks apply to barrier creams only in relation to cutting* liquids—their possible use in other connexions is not considered. Many operatives find that some barrier creams are worse than useless when a slight rash has started; the cream seems to aggravate the skin condition.

A simple preventive measure often neglected is to discourage the wearing of oil-soaked clothes. The man who works with his sleeves rolled down will tend to get an oil rash on the wrist, especially if he is hairy; the man who works with his sleeves insufficiently rolled up will start his rash round the elbow: the best shirts are undoubtedly sleeveless. Most oils become harmful if continually rubbed into the epidermis by means of sodden clothing, and the operatives should learn that it is safer to allow the oil to flow freely on the bared skin.

Finally there is the old question whether oil rashes can be prevented by sterilising the oil by heat or antiseptics or by ridding it of metal particles. They cannot. However desirable clean metal-free oil is on other grounds (such as the prevention of sepsis in minute skin punctures) it is quite easy to produce an oil acne experimentally with clean unused metal-free oil, as I have proved. Furthermore, the addition of antiseptics to oils is a potential danger. In some works it is the practice to centrifuge used oil and add antiseptic; this process if repeated may mean the oil eventually collects a dangerously high concentration of antiseptics, whose presence anyway is of doubtful utility, except as a possible inhibitor of [illegible] where animal or vegetable c[illegible] e oils by heat is safer but is [illegible] some oils. In any case the [illegible] theory of the origin of oil rash is, I think, upset by the fact that mineral oils which discourage bacterial life are much more hazardous [illegible] are better culture media. [illegible] oil acne? The two main [illegible] blocking or chemical irritation of the follicles. I agree with those who believe that oil acne is primarily due to a chemical irritation of the follicles, and this is supported by the simple following observation:

If one experimentally applies more oil to any already present oil acne the papules shortly enlarge; if one withholds oil the papules diminish; if the follicles were already mechanically blocked by oil, one would not expect the application of more oil to affect much change in the papules. Furthermore the chemical theory explains the marked difference of toxicity between one oil and another, the cruder cutting oils being much more hazardous than the high-grade lubricating oil.

SUMMARY

Common cutting oils and liquids are: soluble oils usually called "suds" (often emulsions of mineral oil with a fatty oil saponified with alkali); mineral oil containing a variable amount of lard oil to which colloidal sulphur may be added; paraffin (kerosene) and mineral oil mixtures; and paraffin and mineralised lard oil mixtures.

Skin reactions are mainly either follicular (chronic oil acne and acute oil folliculitis) or eczematoid eruptions. Treatment of the first is by washing twice daily with hot water and soap; treatment of the second is by applying a harmless grease preparation and if necessary arranging a change of job for the patient.

Prevention depends on cleanliness and avoidance of oil-soaked clothes; barrier creams should be only a second line of defence.

Oil acne is probably due to chemical irritation of the follicles by the oil. Sterilisation of the oil or the use of antiseptics in it will not prevent rashes.

In England Now

A Running Commentary by Peripatetic Correspondents

ONCE while walking in northern Italy I spent the night in the village of Feriolo. It was peopled by a fascinating race of dwarfs with big mouths, good teeth and laughing eyes. These little men worked in the quarries for which the place was famous and it was astonishing to see how easily they could move pieces of granite weighing many tons and lift them into wagons with the most primitive of levers and wedges. They sang as they worked but they were very shy of strangers and I felt that one would have to be among them for a long while before being admitted to their friendship. Yet my host at the inn, with whom I sat talking and drinking red wine half the night, unbent magnificently to become a firm friend.

The other afternoon I was labouring fruitlessly with a lithotrite. However skilfully I depressed the nose and however cunningly I went through the manœuvres recommended by the ancients the jaws would close on emptiness and the stone elude me. Suddenly I sensed a swirl in the waters of the bladder, and I was certain that a dozen unseen helpers were busy with primitive levers and wedges, so that in a moment, and with no effort on my part, the stone was lifted into the jaws of the lithotrite. Excitedly I watched the fragments flooding back into the evacuator, fully expecting to see among them one of the laughing men of Feriolo, for I am certain that it is in their image that the Little Men of the bladder are fashioned. They have so many characteristics in common—their craftsmanship, their mistrust of strangers, and their helpfulness to those whom they have admitted to their friendship. Looking back over my early days with the cystoscope I realise now why I laboured so often in vain. It would be one of these resentful little people that would give the mucous membrane a playful kick with his heel causing a mist of blood to obscure a ureter just as it had come into view after a long search. At other times a catheter-tip, obviously heading straight for the ureteric orifice, would receive an unexpected jolt that would send it buckling against the adjacent mucosa. Then perhaps I would get a fleeting glimpse of a retreating figure that would give me an impudent grin, cock a snook and disappear. Yet now, having wooed these small folk with patience and gentleness and some measure of understanding, I look forward with their help to "cystoscopy without tears." For one of their guides is invariably waiting to point out an orifice hidden behind obscuring œdema and willing hands push home the ureteric catheter tip. But even now, when I count them as my friends, these gremlins of the bladder are resentful of any omission of routine or scamping of formality. Roughness and hurry they abhor. Always must they be soothed with a libation of procaine and sometimes offered an assuagement of adrenaline.

I fear I shall never return to Feriolo but I should dearly love to tell my friend at the inn of his cousins of the bladder.

* * *

The little things by which we are judged. In consultation with a colleague recently we entered the patient's room together to find her curled up apprehensively in a corner like an attractive Siamese cat. A few days later, when all her troubles were over and I called again to y social compliments, she said to me, "Do you know: r, why I had confidence when I met you?" I replied I did not, and she then remarked, "Well, I noticed you were partly left-handed, and so was my father, who was a surgeon, and so I knew all would be well."

* * *

As is only natural at this time of the year we got talking about holidays. With the physician in a minority of one, there was unanimity in grousing at the restrictions imposed by war conditions. (The physician's last deviation from full activity was in 1913, yet I am bound to say he looks the fittest of the lot of us.) Somebody advanced as a general proposition the principle of making one's holiday as complete a reversal as possible of one's normal life and living. Thus the surgeon, one of those dreadful methodical creatures who scrupulously employ every minute of their waking hours, would be boarded out with some Bohemians who ate and slept when the spirit moved them, who to be sure possessed a clock, though whether it was half an hour fast or two hours slow was a matter of complete indifference to them. The poor little radiographer who was helping his missus to keep house, to cook, clean up and look after newly-arrived twins, would be accommodated in a luxury hotel where the exercise of vital functions would be the sole claim on his activities. The pathologist, a typical club-man whose only idea of the country was a place where they grew stuff to eat in London, would be provided with a labourer's cottage and compelled to learn that the familiar reference to the sweat of one's face had a literal as well as a poetical meaning. The assistant physician put in a plea for a busman's holiday. He would revel, he said, in a magnificently equipped hospital where he would be shown a large number of interesting cases all completely worked out; when, all day long, information would be poured into his eagerly receptive channels. As a sine qua non, he was to be asked no questions.

And then the gynæcologist, ostensibly facetious but not without a suggestion of seriousness, advanced the attraction of a month in jail. Granted of course the possibility—if there be a possibility—that incarceration could be ensured without the customary stigma, he was fluent with advantages. First of all, the absence of expense; indeed, so he understood, it was possible to earn a little pocket-money. The diet entrusted to the solicitude of experts was above criticism in its way. Regularity of meals, of work, of relaxation and of exercise was perfectly organised. An abundance of uninterrupted sleep was guaranteed. One enjoyed a mental tranquillity which proceeded from the absence of any necessity to make decisions or keep up appearances, and above all, an unexceptionable inaccessibility to telephonic intrusion.

That, *pace* my talented peripatetic colleague of a few weeks back, was his trump card. For our profession is the outstanding victim of this curse of civilisation which, like all other modern inventions, has its uses but also abuses, against which one vainly contends. You may employ a spirit-lamp for its rapid action in boiling kettle; it is not economical to use it to heat a room The telephone has its indication in emergency; it wa *not intended to replace all other forms of communication* as the lazy moderns evidently imagine and intend What can be the frame of mind of the person who telephones you at your private address to ask some questio or other about his symptoms or his treatment althoug you may not have seen him for months, even years Does he really suppose that you can retain in your hea pigeon-holed for immediate reference all details clinica and therapeutic of everyone you have ever seen? Doe he ever reflect on the abominable unreasonableness an impertinence in dragging you from rest or recreation—thus ensuring a headache, or from a meal—thus ensurin dyspepsia? No wonder we suffer from duodenal ulceration and coronary thrombosis. (I refuse to believe th statistician's pronouncement that these are not unduly prevalent in our profession.) Has he not sufficien imagination to visualise your telephone in some comparatively public place, and the embarrassment consequent on your discussing intimate physical detail before a giggling audience? Moreover, any advice h receives in this way he regards as legitimately gratuitous although the responsibility on your part is increased by the circumstances, the want of any opportunity fo reflection, and the danger of misunderstanding. Yet if rebuked for unreasonableness he is invariably resentful and becomes a life-long enemy. As a rule we are unable to protect ourselves against this infliction. A telephone we must have, for there are genuine emergencies, however widely spaced, for which it is indispensable. But situated as we are, and according to common etiquette, it is impossible to put up a barrage. It is not difficult for anyone to convey the impression that his business is urgent, whatever it is; and the intermediary who summons you is not in a position to assess the degree or truth of the alleged urgency. Time may be gained by going "to see if Dr. X is in" or a possible protection is afforded by having to [illegible] Dr. X "in his bath." [illegible] to inquirers why Dr. X [illegible] day and night! [illegible] a talkative little wife [illegible] For the sex has taken [illegible] Two women will enjoy [illegible] conversation although they have actually arranged to meet within half an hour. So the doctor's wife, by blocking the line during most of the day, may contribute to her husband's protection.

Letters to the Editor

GOING UNDERGROUND

SIR,—Have you tumbled to what is happening in the mining industry? There have been three cases reported in the papers of young men, pleading nervous trouble as a reason for not going down pit, being sentenced to imprisonment for their refusal. In one, about three months ago, Mr. Shinwell brought it up in the House and only then was it recognised that the man (given three months) was a claustrophobe. He had previously been examined by a medical board and found fit to work underground. Young Page in Lincoln prison, whose objection to going down was described in the paper as "psychological," has agreed to train for pit work on condition that he is medically examined before going down. The Notts miners went on strike about his case. The chance is that after the fuss he *may* be examined psychologially. In the *Times* yesterday was reported the case of Lashley, fined £5 or 28 days. The secretary of the miner's lodge, in threatening a strike, says the man is "pit nervous" and it is unsafe for him to go down pit. That secretary is a sounder clinical psychologist than some of us.

In my work on miners' nystagmus I found that men receiving compensation for that disorder were mostly suffering from psychoneurotic symptoms (often phobias) which the eye people failed to recognise and the significance of which they could not understand. One authority on the subject, to whom I put this view retorted that the rigl[illegible] phobias was to stop [illegible] be [illegible] be [illegible]?

Guildford, 17.ix.43. MILLAIS CULPIN.

DOCTORS AND POLITICS

SIR,—You have performed a useful public service in drawing attention to the extraordinary document published by the Sheffield branch of the BMA. Its distortion of facts is worthy of Dr. Goebbels. The Government proposals have not been published, and even the Representative Body of the BMA has not yet decided what attitude it wi[illegible] to terrify the [illegible] by presenting [illegible] sucked into a [illegible] and tossed from one robot doctor to another, while the satanic figure of Mr Er[illegible]

[illegible] at ante- and post-natal clinics, school clinics, child welfare clinics, tuberculosis dispensaries, VD clinics, as well as the numerous outpatient departments of hospitals, and the factory doctor whose supervision many of them who are in industry now enjoy at their place of work, will be frightened by such a bogy story?

Many of us who are already salaried medical officers, whether in the employment of local authorities, hospitals, or government departments, are becoming a little tired of the implied slight on us made by certain [illegible] some of the anti-planners suggest.

[illegible]

F. H. TYRER.

ACCESSORY HEART SOUNDS

SIR,—I am in complete agreement with your annotation of Sept. 4 that the "split" second sound should be clearly distinguished from the normal third heart sound. Unfortunately the term "reduplicated" second sound has been applied to both these phenomena. You regard [illegible] correct). Clinically, a[illegible] distinguish between the [illegible] rhythm of the sounds [illegible] asynchronous closure [illegible], it is best heard at the base of the heart, whereas the third heart sound being due to the tension set up in the A-V valve cusps by the first inrush of blood from auricle to ventricle is best heard at or near the apex. To prevent confusion it would appear desirable to avoid the ambiguous term "duplicated" and to speak only of a "third heart sound" and of a "split second sound." But it will take time to accustom clinicians to this nomenclature.

Manchester. CRIGHTON BRAMWELL.

FIRST AID FOR FRACTURE OF LOWER JAW

KELSEY FRY-MOIR METHOD

SIR,—First-aid teaching on fracture of the mandible is far from satisfactory, and the principal manuals omit essentials. The following instructions, devised in collaboration with Mr. W. Kelsey Fry, are proposed for the use of medical students and first-aiders. If they are acceptable, it would be a great advantage if they were adopted by all the various services and teaching bodies. All first-aiders should be taught the same standard methods.

SIGNS AND SYMPTOMS

Pain. Difficulty in swallowing or speaking. Irregularity in the line of the teeth.

COMPLICATIONS

OBSTRUCTION OF THE AIRWAY, caused by (*a*) the tongue falling back or (*b*) blood-clot, teeth or foreign bodies.

BLEEDING. SHOCK.

TREATMENT OF SLIGHT CASES

If the airway is not obstructed and there is little bleeding or shock, all that is needed is a barrel bandage applied as described below.

TREATMENT OF SEVERE CASES

MOST IMPORTANT: KEEP THE AIRWAY CLEAR.—*If obstruction is obvious, the tongue must be immediately grasped with a dry cloth or handkerchief and pulled forwards.*

The mouth and throat should be cleared with the forefinger.

To prevent the tongue falling back, or blood collecting and clotting in the mouth [illegible]

BLEEDING.—The great danger of bleeding is that [illegible] collect and clot and block the airway. If [illegible] severe the common carotid may have to be [illegible] pressure-point till medical assistance is [illegible]

DRESSING AND BANDAGE.—External [illegible] with a sterile dressing. A barrel [illegible]

SHOCK.—Keep the patient [illegible] rugs and hot-water bottles [illegible] bleeding, fluids (preferably hot sweet tea) can be given through the spout of a feeding-cup or of a small teapot. Reassurance and encouragement will be needed.

TRANSPORT.—(*a*) *Walking*. If the patient can walk, he should rest his hands on somebody's shoulders, so that he can be guided and at the same time keep his head down. (*b*) *By stretcher*. He is placed on a blanketed stretcher in the prone position with his head resting in the crook of his arm. (*c*) *By ambulance or car*. If able to do so, he sits with his head and shoulders forward, if not, he lies prone on a stretcher with his head resting in the crook of his arm.

THE BARREL BANDAGE

The bandage used may be :—

A roller bandage 2 yd. long by 1½–2 in. wide.

A triangular bandage (large size) folded narrow.

A first field dressing. This is a dressing attached to 2½ yd. of bandage 2½ in. wide. The dressing is first detached from the bandage and used as described.

(*a*) Apply the bandage with the patient sitting up if possible.

(*b*) Place the dressing on the wound. Then put the centre of the bandage under the jaw, just in front of the angle of the jaw.

(*c*) Bring the ends of the bandage up over the angle of the jaw and tie them in a simple knot on the crown of the head.

(*d*) Keeping a firm hold of both ends of the bandage, and using both hands, open the knot and bring one loop forwards in front of the forehead while the other goes round the base of the skull, making a circle round the head. The forward loop is brought forward so that it lies just below the eyebrows; the backward loop is carried back to the base of the skull just below the ear. These two loops cross just above and in front of each ear. (NB. The bandage under the jaw must be kept firm throughout.)

(*e*) Tie the ends of the bandage in a reef-knot on the top of the head.

I should be glad to receive comments or suggestions that might lead to the improvement of these instructions.

Cemaes Bay, Anglesey. J. L. MOIR.

Infectious Disease in England and Wales

WEEK ENDED SEPT. 11

Notifications.—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 2432; whooping-cough, 1751; diphtheria, 700; paratyphoid, 5; typhoid, 9; measles (excluding rubella), 516; pneumonia (primary or influenzal), 308; puerperal pyrexia, 157; cerebrospinal fever, 33; poliomyelitis, 9; polio-encephalitis, 3; encephalitis lethargica, 0; dysentery, 201; ophthalmia neonatorum, 95. No case of cholera, plague or typhus fever was notified during the week.

The number of civilian and service sick in the Infectious Hospitals of the London County Council on Sept. 8 was 1689. During the previous week the following cases were admitted: scarlet fever, 227; diphtheria, 41; measles, 18; whooping-cough, 48.

Deaths.—In 126 great towns there were no deaths from scarlet fever or enteric fever, 12 (0) from whooping-cough, 6 (1) from diphtheria, 52 (6) from diarrhœa and enteritis under two years, and 6 (0) from influenza. The figures in parentheses are those for London itself.

There was 1 fatal case of an enteric fever in Greater London.

The number of stillbirths notified during the week was 211 (corresponding to a rate of 34 per thousand total births), including 27 in London.

FILM OF AIR-RAID CASUALTIES.—This colour film, made during the blitz in England, which has already been shown to civil defence workers, Canadian and American Red Cross units, Czech medical practitioners, is still available under certain conditions. Details may be obtained from the manager, Mr. J. Magrill, 17, St. Quintin Avenue, London, W.10.

RUSSIAN MEDICAL FILM.—A film of medical field work in the Russian Army will be shown at the Royal College of Surgeons of England, Lincoln's Inn Fields, London, W.C.2, on Friday, Oct. 8, at 4 PM. Prof. S. Sarkisov will explain the main features of the film and members of the medical profession are invited to attend.

BY a mischance portraits of Dr. CECIL PRICE-JONES and of Dr. AUSTIN BYRNE did not accompany the memoirs in our last issue. Any reader who likes to send a stamp will e a print of either.

Obituary

Wm IRELAND DE COURCY WHEELER

KT, MD DUBL, M CH EGYPT, FRCSI, FACS

Sir William Wheeler, who died in Aberdeen on Sept. 1 at the age of 64, had lived an eager life of unremittin activity. He had practised in two capitals, his ow native Dublin and London; and he had served in tw wars, holding high rank in each in a different servic He came of famous surgical stock, for his father lil himself was president of the Royal College of Surgeo in Ireland. He graduated in the faculty of arts Trinity College, Dublin, as moderator and medallist 1899, and three years later in the faculty of medici with high distinction. He held the appointment demonstrator and assistant to the professor of anatom there and for his research into deaths under chlorofor the Dublin Biological Association, of which he was lat to become president, awarded him their medal in 190 Election to the staffs of the Rotunda and Mercer Hospitals came quickly, and he also lectured in surger to postgraduates in the University of Dublin. Durin the last war Wheeler served with the rank of lieut. colonel as consultant in surgery to HM Forces in Ireland and was donor and surgeon of the Dublin Hospital fo Wounded Officers. His counsel was sought by man official bodies. He was a member of the War Offic council for consultants in 1917, and of their tetanu commission. He sat on the Ministry of Pensions committee on artificial limbs, and he was consultant surgeo to the ministry in Ireland. He examined for the National University of Ireland and the Universities o Belfast, Edinburgh and Glasgow, and he was inspector of examinations for the Medical Registration Council in Ireland.

In 1932 Wheeler migrated to London and the diversit of his interests is well illustrated by his appointment there. He was on the staff of the New Southend-on-Sea Hospital, of All Saints Hospital for Genito-Urinar Diseases, and of the Metropolitan Ear, Nose and Throat Hospital. He also became inspector of hospitals for King Edward's Fund. And this all-roundness made him a valued member of the editorial staffs of the *British Journal of Surgery* and of the *British Journal of Urology*, while his American contacts made him an obvious choice as an editorial consultant for *Surgery, Gynecology and Obstetrics*. As one of the few British Murphy orators he addressed the American College of Surgeons in 1932 on the surgery of the blood-vessels, and he also held office as president of the Post Graduate Assembly of North America. In this war Wheeler served once more, this time as a surgeon rear-admiral, and at the time of his death he held the appointment of consulting surgeon t the Royal Navy in Scotland.

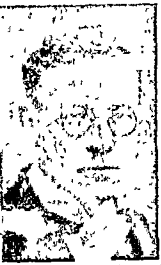
Wheeler married in 1909 Elsie, the eldest daughter o Baron Craigmyle, then the Rt. Hon. Alexander Shaw KC, MP, and they had a son and a daughter.

G. G.-T writes: Wheeler was always immensel proud of the medical and surgical tradition of Dublin and of the hospitals where he received his early trainin and where the major portion of his surgical life was spent He adhered with staunch devotion to those methods o surgical technique in which he had been schooled o which he had embraced as a postgraduate disciple in clinics in Britain, America or Europe; he admired Moynihan, worshipped Kocher, and adored Robert Jones. Yet he was no mere *laudator temporis acti*, despite his hero-worship and his rich knowledge of surgical, and especially Irish surgical history. Though intensely loyal to the Thomas splint, he was not bigoted or blind to the value of plaster-of-paris; he was not merely a suprapubic prostatectomist, but also an expert in endoscopic resection; the first occasion on which I saw de Martel's intestinal clamp used was in the Mercer's Hospital about 1923. Till the end of his life he retained that feeling "which impels a teacher to be a contributor and to add to the stores from which he so freely draws." His surgical interests and writings were catholic in their scope; the list of his contributions bewilders by their number and the diversity of subject, and the reader is enthralled by the presentation and captivated by the impeccable language in which each communication is couched. Wheeler had a special nterest in the injuries and diseases of bone. He was an ntransigent opponent of all who dared to decry Syme's amputation, and hostile criticism of the operation only made him champion the procedure more ardently. All Irishmen are politicians, and Sir William did not shrink from the eddies of medical politics. He had a lively wit, and his countrymen's gift of repartee. He was an entertaining raconteur, and his natural kindliness made him a popular examiner; it was a privilege to be his patient, for within him there beat a heart of gold."

GEORGE MACBETH CALDER

M B EDIN; CAPTAIN RAMC

Captain G. M. Calder, the eldest son of Prof. W. M. Calder, FBA, was wounded at El Alamein last October and died of his wounds in Cairo in April. He was born in Aberdeen in 1912 and educated at Salem, Baden, and at Edinburgh University where his father holds the chair of Greek. He qualified in 1936 and had gained experience in house-appointments and as locum in several practices before he joined the RAMC. In the Army he served at first with a field ambulance, but later he had an opportunity for psychiatric work, the branch of medicine in which he was particularly interested.



Bacon, Edinburgh

W. M. M. writes: George Calder's appearance was fittingly striking—a mop of unruly red hair, a broad confident build, a voice that reverberated enthusiasm. Of rare intellect, he was at the same time practical, skilful with his hands, a keen and talented sportsman. He had a strong political sense, was well informed, and loved an argument or a debate. Having been educated in Germany he spoke German fluently; he knew Nazism better, and despised it more, than most people. He loved accumulating out-of-the-way information and in many amusing ways applied this knowledge in making

n-teasers. Beneath

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is fellow men. He

Once, as a student, while the others were eagerly attending to a lecture round an aged patient, George Calder could only notice that the lecturer to emphasise his points was throwing the temperature chart on the old lady's sore leg. As though it were the most natural thing to do he raised his voice above the lecturer's, and stopped him in the middle

have become eminent in his profession, but his friends at any time of need were sure of finding him smiling, willing and most competent human.

DONALD ALEXANDER COLES

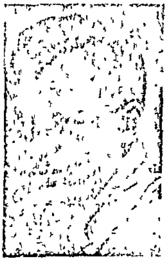
M D BRUX, M R C S

MANY will learn with sorrow of the death of Donald Coles at the age of 88. On the distaff-side he claimed Scottish descent; but it only landed him in an interminable law-suit over an estate in Morayshire which, after the case had been won, had to be sold to pay the lawyers. Otherwise he was typically a Londoner. His mind was always keenly and widely alive, never satisfied with any specialised branch of his profession. He qualified in 1879 from St. Bartholomew's Hospital, and after holding house-appointments there and at Great Ormond Street he joined a partnership in Chiswick. The last war brought him back from Jerusalem, where he had been attached to the English Hospital and where he had acquired much experience of the East, its political problems, its art and traditions. He became medical officer to the Gas, Light and Coke Company of London. Still ready, though now in his sixties, to take interest in every advance in knowledge, he was soon accepted as an authority on industrial hygiene which was just developing as a new branch of medicine. He became an associate editor of the *Journal of Industrial Hygiene* and the medical committee of the Industrial Welfare Society were quick to recognise in this great-hearted and well-informed enthusiast an ideal chairman. Once Coles was presiding, business was sure to be harmonious and discussion to the point. Moreover, he always attended meetings, whether at home or abroad—even, as his friends discovered one evening by chance, on his golden wedding day.

ASHELEIGH LEWIS THORP

M B DURH; CAPTAIN RAMC

Captain A. L. Thorp was one of the medical casualties of the landing in Sicily. He was killed in July while



training at King's College, Newcastle-on-Tyne, where he was good at all sports, particularly swimming, football and long jumping. After graduating in 1940 he spent twelve months in a resident appointment at Sherburn Hospital, co. Durham. He joined up in 1941 and saw service in India as well as in the Middle East. He was twenty-five years of age. Mr. Stanley Ritson, his chief at Sherburn writes: "Thorp was a tall young man, modest and with pleasant manners. He had a zest for life and its enjoyment, but also an earnest desire to do good work, to improve his professional knowledge and to live up to the ideals of his profession. During his stay with us he proved himself keen, reliable and energetic, and gained the affection and respect of us all. We heard from him at intervals during his period of service, but his letters asked more after the welfare of those at the hospital than told us of his own. He was a fine young fellow."

HELTON GODWIN BAYNES

M B CAMB

Dr. Godwin Baynes, who died on Sept. 6 at the age of 61, was one of the leaders of the second generation of modern psychotherapists. A teacher without a school, he leaves few pupils but many friends. He pointed the

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From graduation onwards his main interest had been medical psychology, and in 1919 he went to the Maudsley Hospital as a resident. Thence he moved to Zürich to become assistant to Jung for several years, and in 1925 he organised Jung's expedition to East Africa for psychological research among Masai tribes in Kenya. Later he translated and edited some of Jung's works.

About the close of last century a new dimension had been added to the study of man's emotional, intellectual and social life; the unconscious had become the richest [illegible] and afforded the greatest [illegible] nstructive enterprise. Two names are outstandingly

characteristics of a person's behaviour to events in that person's own past experience which were for the most part hidden; Jung tried by study of individual behaviour and development to discern the influence of extra-personal forces upon the course of personal destiny. In a culture that set high value upon the analytical techniques and was ready to dub as quackery any attempt to use intuition and analogy as the main guide in a serious investigation, it needed courage to follow the path Baynes took. Unlike the weaker folk who allow themselves the illusion that good will triumph in if faith be but blind enough, he approached the of neurotic disorder in terms of a conflict between archaic forces of constructiveness and destructiveness which found expression in manifest and disguised form in human behaviour, and whose roots were revealed in dreams, works of art and social structure. Some dismissed his works on the ground that they were empirical; others read them for that very reason. He wrote them to disclose the way in which these protean forces could, if faced squarely, be prevented from wrecking the lives of men. Distrusting systematisation, his teaching had imaginative force rather than the provision of frameworks of reference; when reproached with his neglect of posterity he sighed and said that his writings would some day be forthcoming. In 1939 appeared his great book *Mythology of the Soul*, which in size, depth and breadth of vision embodied his best work; and then, by a cruel turn of fate, the stocks of the book were bombed so that comparatively few copies remain.

Baynes's independence of mind, and the difficulty—inherent in any work depending largely on intuition—of linking up his findings with those of others using another method or approach, have led to unmerited neglect of his often penetrating thought; his prose was serene but his idiom difficult. Many may overcome the difficulty for themselves, or there may arise an interpreter. A few had the privilege of seeing his mind, informed and guided by a spirit of uncommon depth of feeling, at work upon the profoundest mystery of this or any other time.

Notes and News

FUTURE OF FRIENDLY SOCIETIES

Sir William Beveridge in his report on Social Insurance assumed that the approved society system would have to go because of the inequality in the state benefits which it offered, and that sickness benefits could not be entrusted to societies and companies without responsibility for administering them carefully. He proposed that industrial insurance should be taken over as a public monopoly, using the existing agents as servants of the community, with no interest save that of service to the public. But he was clear that friendly societies which are now offering sickness benefit of their own should continue to administer state benefit as fully responsible agents. In an important address delivered at Stroud last Saturday, reported in the *Times* of Sept. 20, he regretted that the National Conference of Friendly Societies had decided to put forward a plan conflicting with the fundamental principle on which health insurance had been administered for 30 years. The Government, he went on to say, appear to have accepted in principle three of the proposed features—comprehensiveness of income insurance, a national health service and children's allowances—but appear to have rejected adequacy of benefit in amount and time, and have not yet accepted unity of administration. He had hoped that his plan would be put through without delay by general agreement; it was still not too late for this to happen if the people of the country clearly wished it.

NUTRITION SURVEY IN PALESTINE

THERE is little obvious undernourishment in Palestine but a survey now being conducted by the Health Department has already shown that part of the urban population is suffering from malnutrition due to poverty. The rural population is believed to be better off now than ever before. The survey is covering the whole country and taking account of both Jewish and Arab communities; it is linked with the school-feeding scheme for Arab children in the larger towns. Children of both groups have suffered more from malnutrition than adults. The most serious dietary deficiencies are of fats and calcium, especially among Arab children. The Jewish school-feeding scheme has improved the nutrition of poor Jewish children and it is hoped that the government plan for providing school-meals for Arab children will have an equally good effect. There was less vitamin deficiency than had been expected, since vegetables and fruit in season offer a good source of many of them. Iron deficiency is commoner among the Jews than among the Arabs, who use more iron-containing plants in cooking. An educational campaign, to encourage vegetable-growing and conservative cooking, should put this right. Poor housing and high rents contribute to poverty and hence malnutrition.

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HOSPITALS APPROVED FOR RADON SUPPLIES

THE following hospitals have been approved for radon supplies by the National Radium Commission:—

Aberdeen Royal Infirmary.
Birmingham United Hospital.
Bradford Royal Infirmary.
Bristol Royal Hospital.
Burnley Victoria Hospital.
Bournemouth, Royal Victoria and West Hants Hospital.
Cambridge, Addenbrooke's Hospital.
Cardiff Royal Infirmary.
Charing Cross Hospital, London.
Edinburgh Royal Infirmary.
Glasgow Royal Cancer Hospital.
Glasgow Royal Infirmary.
Glasgow Western Infirmary.
Guy's Hospital, London.
Hull Royal Infirmary.
King's College Hospital, London
Lambeth and Hammersmith Hospitals, LCC.
Leeds General Infirmary.
Leicester Royal Infirmary.
Lincoln County Hospital and Scunthorpe Hospital.
Liverpool Radium Institute.
Liverpool Royal Infirmary.
London Hospital.
Manchester Royal Infirmary and Holt Radium Institute.
Marie Curie Hospital, Hampstead.
Middlesex Hospital.
Mount Vernon Hospital and Radium Institute, Northwood.
Newcastle, Royal Victoria Infirmary.
Newport, Royal Gwent Hospital.
Northampton General Hospital.
Norwich, Norfolk and Norwich Hospital.
Oxford, Radcliffe Infirmary.
Plymouth, Prince of Wales's Hospital.
Rochester, St. Bartholomew's Hospital.
Royal Cancer Hospital (Free), Fulham Road.
Royal Free Hospital, London.
Royal Northern Hospital, Holloway Road.
St. Bartholomew's Hospital, London.
St. George's Hospital, London.
St. Mary's Hospital, Paddington.
St. Thomas's Hospital, London.
Sheffield Radium Centre.
Southampton, Royal South Hants Hospital.
Stoke-on-Trent, North Staffordshire Royal Infirmary.
Swansea General Hospital.
Tunbridge Wells, Kent and Sussex Hospital.
University College Hospital, London.
Westminster Hospital.
Wolverhampton Royal Hospital.

AT the annual representative meeting of the British Medical Association, held in London on Sept. 21–23, Lord DAWSON was elected president. He was president in 1932, the association's centenary year.

Royal Society of Medicine

On Friday, Oct. 1, at 2.30 PM, Dr. R. J. Minnitt will deliver his presidential address to the section of anæsthetics. His subject is to be the history and progress of gas-and-air analgesia for midwifery.

Middlesex County Medical Society

The annual general meeting will be held at 5.15 PM on Tuesday, Sept. 28, at the Middlesex Guildhall, Westminster, S.W.1, when Dr. T. O. Garland will speak on changing medicine.

SIR KINGSLEY WOOD, who died suddenly on Tuesday was Minister of Health from 1935 to 1938.

CORRIGENDA: *Laboratory Control of Typhoid.*—In the report of a meeting of the fever hospital medical service group of the Society of MOHs (*Lancet*, Sept. 11, p. 323) the initials of one of the speakers, Lieut.-Colonel H. T. Findlay, were incorrectly given.

In Dr. W. N. Leak's definition of democracy (Sept. 18, p. 367) the word " only " should be omitted.

Births, Marriages and Deaths

BIRTHS

BREWERTON.—On Sept. 15, in London, the wife of Lieutenant R. E. Brewerton, RAMC—a son.

CORCORAN.—On Sept. 11, at Llandrindod Wells, the wife of Major T. M. Corcoran, RAMC—a son.

DANIEL.—On Sept. 2, at Oxford, the wife of Dr. Peter M. Daniel—a daughter.

GREGG.—On Sept. 12, in London, the wife of Surgeon Lieutenant D. McC. Gregg, RNVR—a son.

HINDLEY.—On Sept. 8, at Ruanda, Belgian Mandated Territory, the wife of Dr. G. Talbot Hindley—a son.

HULBERT.—On Sept. 16, in London, the wife of Dr. N. G. Hulbert—a daughter.

STEPHENS.—On Sept. 14, in London, the wife of Captain H. N. D. Stephens, RAMC—a daughter.

MARRIAGES

CLARKE—FRASER.—On Sept. 11, at Aberdeen, William Edward Clarke, surgeon lieutenant, to Helen Susanna Fraser, lieutenant RAMC.

COLTART—DRUITT.—On Sept. 11, at Petworth, Wilfrid Seymour Coltart, MB, of Chichester, to Jean Margaret Druitt.

GREENWOOD—MALIM.—On Sept. 11, at Saffron Walden, Kemble Greenwood, lieutenant RAMC, to Lavinia Mary Malim.

DEATHS

LEWIS.—On Sept. 14, at Pontypridd, Kingsley Wassell Lewis, MB LOND.

STIFF.—On Sept. 16, Harold Henry Stiff, MB CAMB, of Winchester, aged 70.

TREWBY.—On Sept. 10, at Rothwell, Lilian Trewby, LRCPE, sometime MO i/c Lady Dufferin Hospitals at Shikarpur and Amraoti.

MEDICINE AND THE COMMUNITY

THE TASK OF STATESMANSHIP

A SPEECH TO THE BRITISH MEDICAL ASSOCIATION

LORD DAWSON OF PENN, FRCP
PRESIDENT OF THE ASSOCIATION

MEDICINE does not stand alone, it stands in relation to the whole social organism. An upheaval at once so vast and universal as this war must change the texture of civilisation, and the changes will for the most part be those already in seed or in bud, waiting for some impetus to bring them to fruition. Land tenure, plan- [illegible] social [illegible] there [illegible] rough [illegible] rying [illegible] so as to give direction and equality of opportunity without *blunting the enterprise and zest of individual man to* think and strive for the benefit of himself and his kind and thus preserve to personality freedom and scope. If in that partnership the scales are weighted too much in favour of community direction, the result will be regimentation and a deadening uniformity, and if weighted too much in favour of individualism the result will be haphazard and uncoördinated service; thus the task of [illegible] social conscience, an [illegible], has found expression in the humanising of industry and in a body of social efforts without precedent and a body of legislation to improve the health and welfare of the people. But if we pause to inquire whether the achievements of social reform between the last war and this, as judged by the removal of social inequalities and the establishment of social justice, were effective, our answer would have to be No. I need but instance housing, social security, medical services and education; there has been and there still is a sense of frustration in the community.

To focus on our own special concern, is it not a reproach, in view of the way medical knowledge has marched ahead, that a corresponding comprehensive health and medical service has not been made available to all citizens long ere this? In this connexion the pioneer fforts of the medical profession stand forth to its credit, nd I am going to stress that historical truth. From 920 onward it has, through various agencies, successively nd [illegible] ervi [illegible] olun [illegible] ffort [illegible] epre [illegible] rom [illegible] he o [illegible] ny su [illegible] hat tl [illegible] t the [illegible] cooperation, and, let me say further, that the present Minister, who is greatly interested in this reconstruction, has repeatedly stated that this comprehensive service should be a partnership between the local authorities and voluntary hospitals and that in the administration of such a service doctors would play an important part.

Since the Interim Report of the Planning Commission saw the light of day the Beveridge report on Social Insurance has come into the picture. Most of us would say that greater security against want is socially just, but the social-security scheme postulates Assumption B, which is concerned with a nation-wide comprehensive service; the inference is that the foundation of such a service is an accepted policy, and incidentally it has wide and strong popular support.

* * *

In recent weeks there has been public misunderstanding because discussion about the form of the service has been interpreted as opposition to its foundation, and this has led to a considerable amount of criticism of the profession which shows at present little sign of abatement. An illustration has arisen from the motion passed at yesterday's meeting, when by a large majority "a whole-time, salaried state medical service" was rejected. No less than 3 intelligent people said to me last evening that they were surprised to see that the Representative Body had, after all, voted against a "state medical service," which is quite a different proposition, for it is impossible to carry out Assumption B without the state having a general direction.

Needless to add, in the shaping and organisation of the service doctors must have a big say; after all, they have to work it, they know the complexities of medical practice, and they, with the public good in the forefront of their minds a [illegible] of Parliament, must car [illegible] Be it remembered that the [illegible] be wrought are deep and [illegible] members of the profession, and no other nation, comparably placed, has undertaken so big an endeavour. Is it not obvious, therefore, that this service must be built up in stages, in accord with the Prime Minister's Five Year Plan, foundations first? I will now consider one of these foundations.

[illegible] and the Minister has promised that the profession shall have a large share in such administration. What, then, is the best form of local administrative body for this service, for that, after all, is the prerequisite to any [illegible] ettled first. Should [illegible] major local authori- [illegible] several major local [illegible] bodies attached (and [illegible]; or should there be la [illegible] health purposes, each administered by a widely representative Health Council?

[illegible] he most far-sighted and [illegible] or the public and the [illegible] t of future development. [illegible] it favourable consideration, but we must remember this, that the Minister of Health is between the upper and nether stone. On the one hand he has to pay attention to the medical profession and wishes to do so; on the other he has to carry along with him the local authorities. Local authorities might not be too eager to agree to the larger plans which I personally would favour—health provinces administered by a representative health council.

* * *

In the light of Assumption B, the Beveridge report leaves to the medical profession and the community the devisal of the comprehensive service. The social-security [illegible] maintenance payment, [illegible] voluntary insurance to [illegible] ere contributory schemes would provide amenities according to the taste of the patient. Supposing a grocer who by his industry has become a successful man wants to provide his sick wife with the comforts of [illegible] denied that privilege? [illegible] infinitely flexible. M [illegible] us beware of the doctrinaires who think in terms of tyrannical uniformity, one of the faults of the Nazi creed. We want the same essential service for all—namely, the best, but no dull uniformity with it. A comprehensive service free to all citizens does not necessarily involve a whole-time salaried service for all doctors, nor is it incompatible necessarily—I am not saying desirably—with private practice and pay blocks. Though, in my belief, more earnings in the future will be derived from salary and less from fees, I am far from convinced that any uniform system of service or payment will meet conditions so multifarious as those attaching to medical practice, and any emergence of official and non-official groups of doctors would, in my opinion, be disastrous.

We must recall that one of the evil consequences of the Ministry of Health not accepting the advice of the leaders of the profession in 1920 was that they thereby instituted in any one town, two sets of hos [illegible] two groups of doctors. If they had th [illegible] advice and instituted machinery for [illegible] coordination of local government and v [illegible] we should be much nearer our goal toda [illegible] Fortunately we now have at the Min [illegible] order, anxious to work with the profe [illegible]

Payment by salary, by fee, by capitation grant, separately or in combination, these admittedly thorny questions can only find their solution in the light of experience. Any satisfactory scheme for a comprehensive medical service can only be built up in stages—foundations first and soon, superstructure later and gradually in the light of accrued experience. Such experience could be obtained by different "try-outs" in different regions during an experimental period, and that applies, for instance, to health centres. Customs, habits and feelings, many of them centuries old, must not be suddenly uprooted, rather must the new order be gradually grafted on to medicine's historic past. Such is our English way. So following it, not otherwise, when its re-orientation reaches completion medicine will have become greater in its comprehension and will offer to its disciples a life of fullness and content, and to the people a steadily enlarging prospect of health and welfare.

PATHOLOGY OF ACUTE HEPATITIS

ASPIRATION BIOPSY STUDIES OF EPIDEMIC, ARSENOTHERAPY AND SERUM JAUNDICE

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THE problem of jaundice in war-time is of such magnitude that we decided to amplify and extend the biopsy studies of its pathology started in Denmark by Iversen and Roholm (1939). Our main morbid histological findings are presented in this paper with some preliminary clinical associations. More detailed analyses of the technique and its applicability, and of biochemical correlations, will be published later.

TECHNIQUE AND RISKS

The technique is essentially that of Iversen and Roholm (1939). A small cylinder of liver tissue is aspirated into a 2 mm. bore cannula passed transpleurally through an anæsthetised track into the right lobe of the liver. The tissue is fixed in absolute alcohol, sectioned and stained histologically by standard methods, including glycogen staining by Best's technique.

Though liver puncture for diagnostic and research purposes has long been used in the tropics, it has not gained any popularity in western countries on account of its undoubted risks. Yet it is probably safer than spleen puncture and of much greater value. A survey of 613 published cases with 6 deaths (Bingel 1923, Olivet 1926, Huard, May and Joyeux 1935, Baron 1939, Iversen and Roholm 1939, Tripoli and Fader 1941) shows a mortality of about 1%, mainly in severe anæmias (2 cases with hæmoglobin under 15%), and in severe obstructive jaundice. We felt, however, that this risk could be considerably reduced by a careful selection of cases, precautionary measures such as are usual when operating on a jaundiced patient, and a close watch for, and prompt transfusion in, hæmorrhage. Moreover Iversen and Roholm had claimed 160 punctures with no fatalities. No immediate bleeding was recognised in any of our cases, but 3 out of 126 punctures were followed by signs of hæmorrhage within 24 hours. Two were promptly transfused and gave no further anxiety. In the third, a severe case, the patient died and at autopsy acute liver necrosis was found. A fourth case, already moribund from subacute liver necrosis with ascites, general paralysis of the insane and rectal carcinoma, developed signs of hæmorrhage 48 hours after the puncture and considerable blood-staining of the ascitic fluid was present at autopsy. The risks are thus maximal in the most severe cases.

The technique, therefore, cannot be recommended as a routine procedure. Applied with full knowledge of the risks, and under conditions permitting a close watch on the patients, it yields results of considerable value, justifying its application to the research study of obscure cases of jaundice. No deaths have occurred in non-jaundiced cases in which there may be an even wider field of application.

MATERIAL

Adult cases of epidemic hepatitis admitted to this hospital during the year 1941–42 have been studied. The Army authorities cooperated in the investigation by putting at our disposal cases of jaundice developing during arsenotherapy for syphilis. The American Red Cross Harvard Unit also invited us to apply the method in cases of hepatitis following the inoculation of mumps convalescent serum. To this group we add 2 cases of jaundice which followed serum transfusions in this hospital (for burns and hypoproteinæmic œdema). The cases can be tabulated as follows:

	Cases		*Biopsies*	
Epidemic hepatitis	14	56	18	61
Arsenotherapy jaundice ..	35		35	
Serum jaundice	7		8	

Although there may be different ætiological factors in each of the above groups, we have not found any recognisable histological criteria for their differentiation. A hepatic inflammation of varying intensity and distribution is common to them all, and therefore for purposes of pathological description we may disregard this ætiological grouping and consider the findings as a whole.

PATHOLOGY

The changes in the liver are related to the severity and duration of the disease. For purposes of comparison we have dated the condition from the onset of jaundice, although there is always a variable period of diverse prodromal symptoms.

Broadly speaking, the picture is one of hepatic cell necrosis and autolysis, associated with leucocytic and histiocytic reaction and infiltration. The centres of the lobules show the first of these changes most markedly and the portal tracts the greatest cellular infiltration. In certain cases, which seem to be either those which are mild from the beginning or in which the lesion is retrogressing, the periportal cell accumulations predominate in the picture (fig. 6), in contradistinction to the more severe cases in which hepatic cell degeneration is more pronounced and the histiocytic and leucocytic infiltration more widespread (figs. 1 and 4). For descriptive purposes we call the first of these the "zonal" and the second the "diffuse" type of change, but it must be understood that there are no good reasons for regarding these differences as fundamental, and that an intermediate picture occurs which we have denominated a "mixed" lesion (fig. 5). Finally, there are those cases in which the lesion is well on in the phase of retrogression, or is progressing to a stage of necrosis, nodular hyperplasia or cirrhosis.

FREQUENCY WITH WHICH THE DIFFERENT PATHOLOGICAL LESIONS WERE FOUND IN RELATION TO DURATION OF DISEASE AND INTENSITY OF THE JAUNDICE

Type of lesion	Duration in weeks			Serum bilirubin (mg. per 100 c.cm.)
	Under 1	1–2	Over 2	
Diffuse	12	2	1	3–17·2 (mean 8·0)
Mixed diffuse and zonal	7	4	3	2·6–14·6 (mean 8·0)
Zonal	9	3	9	Under 1 wk., 2·5–6·3 (mean 4·7) Over 2 wks. 1·1–9·2 (mean 3·3)
Residual fibrosis ..	..	..	6*	..

* Duration 7–26 weeks; only 2 slightly jaundiced,

In the table it will be noted that diffuse lesions are seldom encountered after the second week, and that zonal inflammation tends to fall into two groups, one of short and the other of long duration. These correspond respectively to early and mild lesions, and late residual lesions in cases which at an earlier stage presumably showed more extensive hepatic change.

HISTOLOGICAL EXAMPLES

We may illustrate the different degrees of intensity of the liver damage by reference to typical cases.

1. *Severe, acute hepatitis, with a diffuse lesion affecting the whole liver lobule.*

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* Working on behalf of the Medical Research Council.

(1) The lobular pattern is barely recognisable; the liver cell columns are broken up; the degenerated liver cells are replaced by a tissue made up of collapsed sinusoids, with their reticular framework, and endothelial cells. (2) Many of the surviving liver cells show various changes of necrosis and autolysis, with pyknotic nuclei and evidence of cell proliferation in the shape of numerous binucleate liver cells.

This type of picture has been encountered in 15 cases; it is one from which complete recovery may, and in most cases does, occur. The process of recovery illustrated (figs. 1, 2, 3) is discussed in a later section.

An even more severe diffuse lesion is illustrated in fig. 4.

CASE 2.—A male, aged 22, suffering from arsenotherapy jaundice. Jaundiced 5 days, liver enlarged to umbilicus, serum bilirubin 14·2 mg. per 100 c.cm. In addition to the diffuse inflammation (similar to that of fig. 1) the portal tracts show much infiltration with leucocytes and histiocytes.

This unusually severe lesion did not recover in the usual manner. The jaundice ran a long course. Free fluid was detected in the abdomen 3 weeks later. Finally, both the jaundice and ascites cleared, and from the clinical point of view recovery seemed ultimately satisfactory. It is quite possible that nodular hyperplasia and a true cirrhosis may have developed in this patient (compare fig. 9).

2. *Moderate acute hepatitis with mixed diffuse and zonal lesions.*—This picture was found in 14 cases. Here the destruction of the liver lobule is less well marked, and the portal infiltrations are more conspicuous. The histological severity of these cases in general falls into an intermediate class between those presenting the very severe lesions just described and the third group, in which the most obvious changes are in the portal zones.

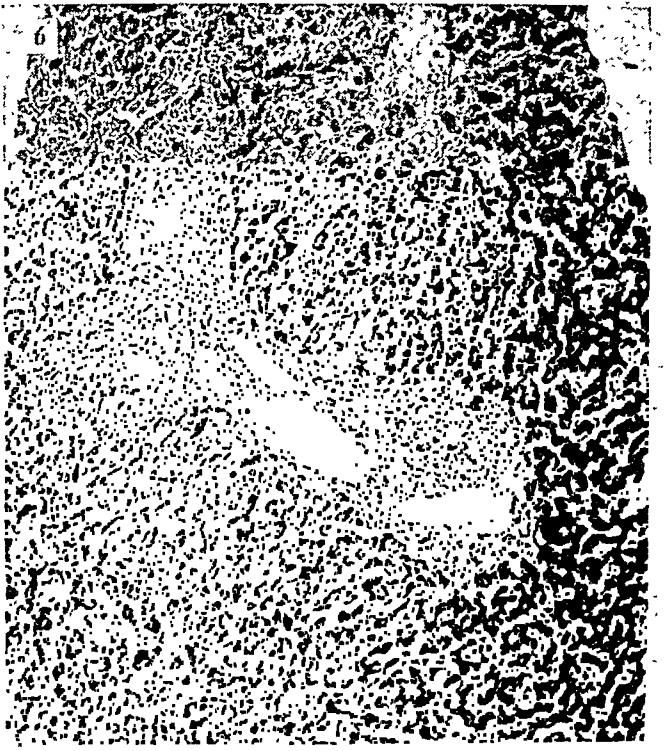

Fig. 6—Case 4. Arsenotherapy jaundice. There is marked cellular infiltration in the portal tracts, the lobule pattern is well preserved and the cells stained darkly by Best's method show their normal load of glycogen. (×80.)

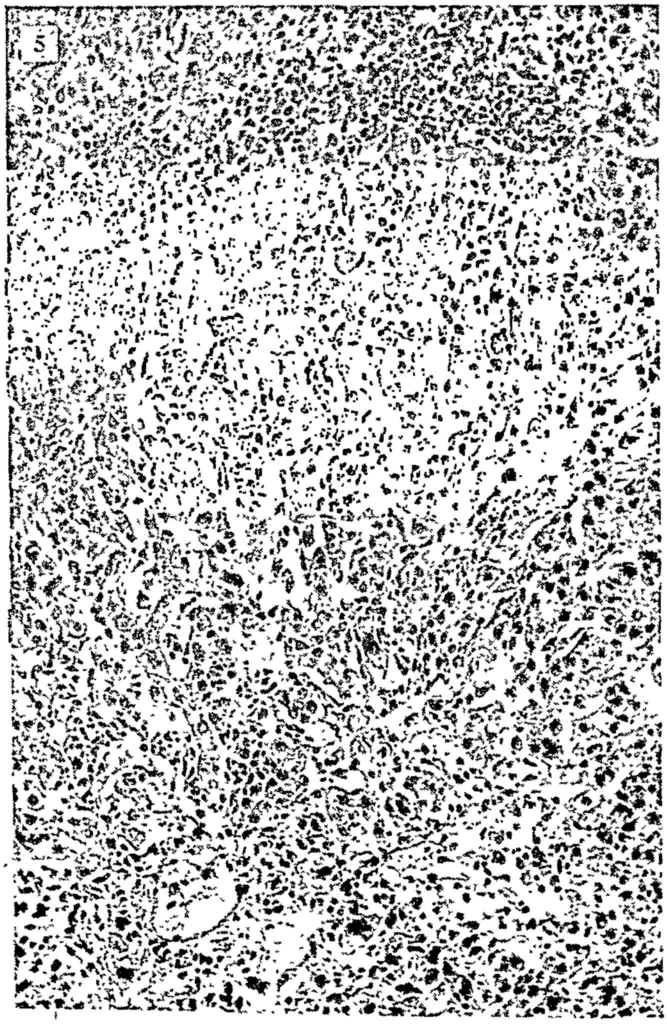

Fig. 5—Case 3. Mumps serum jaundice. Combined focal and diffuse lesion. A central vein is seen below surrounded by an area of cell autolysis. A portal tract above shows leucocytic infiltration. The liver cell columns are partially disrupted and there is extensive sinusoidal cell proliferation and leucocytic infiltration. H. & E. (× 150.)

CASE 3.—A man, aged 19. Jaundice had followed 10 weeks after the injection of convalescent mumps serum. At the time of biopsy the patient had been icteric for 3 weeks. The serum bilirubin was 14·6 mg. per 100 c.cm. The liver section is shown in fig. 5, which includes a central vein and a portal tract. The points which appear are: (1) considerable loss of regularity of liver cell columns and disturbance of the normal architecture of the hepatic lobule; (2) a rarefaction of the cells about the centre of the lobule and some loss of staining—the effects of cellular necrosis and autolysis; (3) an infiltration with small inflammatory cells in the portal zone; and (4) increased cellularity over the whole field, due to leucocytic infiltration and some proliferation of the reticulo-endothelial cells of the liver sinusoids.

In this picture both diffuse and zonal changes are combined. The lesion is of moderate severity, but the patient made an uninterrupted and clinically complete recovery.

3. "*Zonal*" *limited type of hepatic lesion.*—As we have explained, a lesion predominantly in the portal zones occurs in two circumstances. First, it may be evidence of a mild hepatitis in which the lobular pattern is not disturbed and liver cell necrosis is at a minimum. Secondly, it represents a late condition in a hepatitis which is recovering, and it may be associated with other chronic changes.

The early zonal lesion may be illustrated by the following:

CASE 4.—A man, aged 32, suffering from arsenotherapy jaundice. Jaundiced 3 days, serum bilirubin 6·1 mg. per 100 c.cm. The liver (fig. 6) at this magnification shows, as the outstanding change, a cellular infiltration in the portal tracts. The lobule pattern is well preserved, and the cells, stained darkly by Best's method, show their normal load of glycogen. Examination at higher powers almost invariably reveals some of the features we have described in the more severe cases, such as a certain amount of cell autolysis around the central vein, some proliferation of the Küpffer cells of the sinusoids, and some evidence of liver cell multiplication: but the outstanding feature is the cellular periportal accumulation of histiocytes, polymorphonuclear leucocytes and a certain number of eosinophils, which gives this picture a peculiarity of its own.

The retrogressive hepatic zonal lesion is illustrated in figs. 7 and 8.

CASE 5. A man, aged 32, suffering from epidemic hepatitis. Jaundice had started 4 weeks before admission. This cleared up in 9 days, only to recur 7 days before he entered hospital. At this time, when the first biopsy was taken (fig. 7), the bilirubin was 6·4 mg. per 100 c.cm. The jaundice subsided very slowly during the next 6 weeks. The last biopsy (fig. 8) was performed 8 weeks after the first, and 12 weeks after the initial attack of jaundice. The serum bilirubin was now 0·6 mg. per 100 c.cm. At this stage clinical recovery appeared complete.

The first biopsy (fig. 7) shows a wide zone of periportal cellular connective tissue with numerous new bile ducts. The lobule also shows some diffuse inflammatory change becoming more intense towards the centre. The last biopsy (fig. 8) shows a somewhat narrower periportal fibrotic zone with less numerous bile-ducts. The lobular inflammation has subsided.

4. *Chronic residual and fibrotic lesions.*—It is difficult to separate these clearly from the group of late zonal lesions just described. The last biopsy in case 5 illustrates clearly the periportal fibrotic scarring which may persist after clinical cure is apparent. Judging from the extreme rarity of true perilobular cirrhosis in routine autopsies, it seems likely that this type of residual scarring may ultimately disappear altogether. The question of progressive fibrosis will be discussed later.

HISTOLOGICAL DETAIL

It is not proposed in the present paper to go into the histological minutiæ, but for the sake of completeness we may summarise the main features of the changes found:

(*a*) *Hepatic lobules.*—In the severer cases, including all the lesions described as diffuse, there has been severe disorganisation of the architecture of the hepatic lobules. The columns of liver cells are broken up; the individual cells are separated and show decisive evidence of necrosis and autolysis. Many of the cells are swollen, often with large nuclei or with more than one nucleus, while others, in becoming necrotic, are changed into intensely eosinophilic masses, usually devoid of a nucleus. The cytological changes in the mixed and zonal forms are less striking, and in the latter are limited mainly to a swelling and autolysis of cells round about the central vein, and some apparent loss of cells in the region occupied by the infiltration round the portal tracts. In most cases dual and occasional multiple nuclei are common in the liver cells. Mitoses are seen but are less common than might be expected. Inclusion bodies have not been found in the hepatic cells.

(*b*) *Central zones.*—The areas about the central veins usually show well-marked rarefaction due to the disappearance of liver cells. The remaining cells often look bloated, with rarefaction of the cytoplasm and swollen nuclei. The wall of the central vein may undergo hyaline thickening and the entering sinusoids are dilated and much more readily seen than normally.

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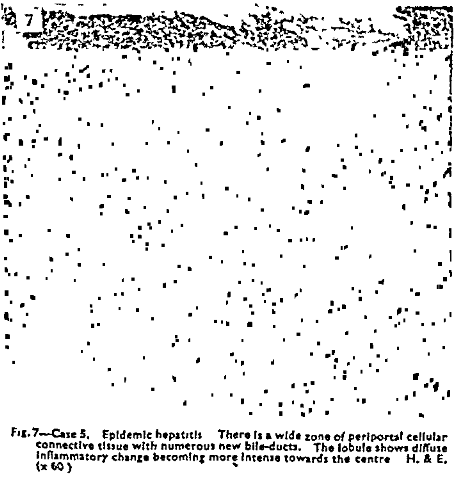

Fig. 7—Case 5. Epidemic hepatitis There is a wide zone of periportal cellular connective tissue with numerous new bile-ducts. The lobule shows diffuse inflammatory change becoming more intense towards the centre H. & E. (x 60)

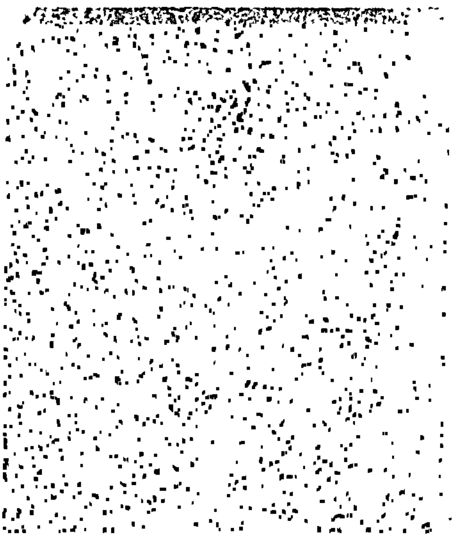

Fig. 9—Case 7. Arsenotherapy jaundice There is extensive fibrous change with the liver cells, many of which are degenerate, split up into islets. H. & E. (x 90)

(*c*) *Portal zones.*—There is a marked tendency for accumulation of cells in these areas. Less noticeable in the severe acute lesion, they are of especial prominence in the milder early acute lesions. The cells are mostly small mononuclear cells of the histiocytic class, but a variable number of polymorphs is present and eosinophils may also be

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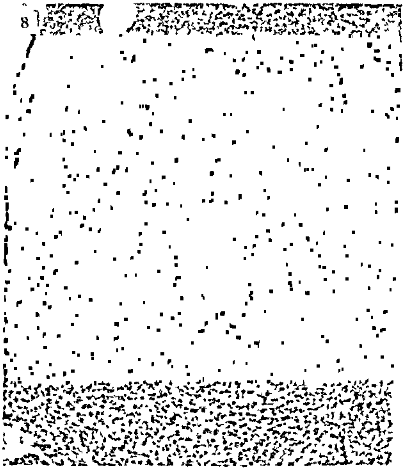

Fig 8—Case 5 (eight weeks later) There is an apparent shrinkage in the periportal inflammatory zone with less numerous bile-ducts The lobular inflammation has subsided H. & E. (x 60)

seen. The infiltrations tend to spread from portal tract to portal tract round the periphery of the lobules, and may send prolongations into the lobules in certain cases. The question arises whether these are simple infiltrations which push aside the tissues, or whether to some extent they replace necrotic liver cells. There is little exact evidence on this point, but since in some of the earliest cases these sites show a condensation of reticulin, suggesting some collapse of this portion of the lobule, it seems probable that liver cells have disappeared from these areas. Sometimes recognisable liver cells are seen trapped among the periportal cellular tissue. In the cases of long standing the portal infiltrations show fibroblasts and new formation of young fibrous tissue

(*d*) *Sinusoids.*—There is a general enlargement and hyperplasia of the sinusoidal "endothelial" cells, giving the liver lobule an abnormally cellular appearance. Here and there these cells form small focal accumulations. It is possible that these are associated with focal necroses. Polymorph leucocytes and eosinophils may also be seen in the lumina of the sinusoids.

(*e*) *Glycogen.*—The glycogen content of the surviving liver cells is usually well preserved. It disappears with cellular autolysis. Odd cells, especially in the severer cases, appear abnormally heavily loaded with glycogen, apparently a necrobiotic phenomenon.

(*f*) *Fat.*—Although special fat stains could not be used for the alcohol-fixed material, there was in most cases a notable absence of any appearances in the cells which would suggest the presence of fatty change In this respect the biopsy material differs from what is commonly found at autopsy.

(*g*) *Reticulin.*—The reticular framework of the lobules is often quite unexpectedly well preserved. When there is much hepatic cell loss—for example, in the collapsed central areas of badly damaged liver lobules—there is a condensation of reticulin, and the same appearance is seen in the infiltrated portal zones. In the residual fibrotic lesions of the portal zones an increase in reticulin is seen which is followed by an increase in collagen.

(*h*) *Bile-ducts.*—In rather over a third of the cases proliferation of bile-ducts was observable in the portal tracts. This occurrence could not be related to the duration or severity of the disease. Rather surprisingly it was less often seen in the more purely zonal type than in the more severe types. (Note their retrogression in fig. 8 compared with fig. 7.) In one fatal case in which the biopsy was made on the fourteenth day of the illness and death took place 3 days later, with the findings usual to subacute necrosis, the sprouting of the bile-ducts was more marked than in any other case in the series (fig. 9). On the other hand, in many of our most severe non-fatal lesions, with durations of from 2 to 19 days, this change is not a prominent feature. In the chronic cases, in which a cirrhosis is developing, bile-duct proliferation is usual, although it may be obscured by the newly formed fibrous tissue.

(*i*) *Pigment.*—Some bile-staining of the central cells of the lobule, many of which are in process of necrosis, is common and was a constant feature. Many Kupffer cells were also bile-stained in the central zone. "Bile thrombi" were often seen and were noted in 22 cases; occasionally they were prominent (fig. 10). The distribution of the thrombi was chiefly in the mid-zones of the lobules; the larger interlobular ducts appear normal.

(*j*) *Iron.*—The Prussian-blue reaction does not show any abnormal quantities of iron in the liver.

(*k*) *Hæmorrhages.*—The alcohol-fixed material is not the best in which to observe small hæmorrhages, but, with this proviso, these have not been found.

HISTOGENESIS AND PROGRESS

It is impossible to give accurate data about the duration of the lesion because we are not able to fix with certainty the time of commencement of the disease. This difficulty is well illustrated by the following case:

CASE 6.—A woman, aged, 24, suffering from epidemic hepatitis. There was a history of a previous attack when aged 9 years She was admitted with headache and dizziness of 7 days' duration. There was neck-rigidity, suggesting meningeal irritation, but no jaundice. Lumbar puncture gave a normal cerebrospinal fluid. Mild jaundice appeared 4 days after entry when a liver biopsy was performed. The serum bilirubin was then 2·5 mg. per 100 c.cm. Four days later it had fallen to 0·6 mg.

The biopsy specimen showed a well-marked portal zonal lesion: there was some bile-staining of the central cells and bile thrombi were found. Polymorphonuclear leucocytes were seen in the periportal infiltration, but early bile-duct proliferation was found, and the lesion was considered, on pathological grounds, to be of a subacute or early chronic nature. It is impossible that these changes could have developed on the day the icterus was noticed, and it seemed probable that the hepatitis was present for at least the whole period of the patient's illness.

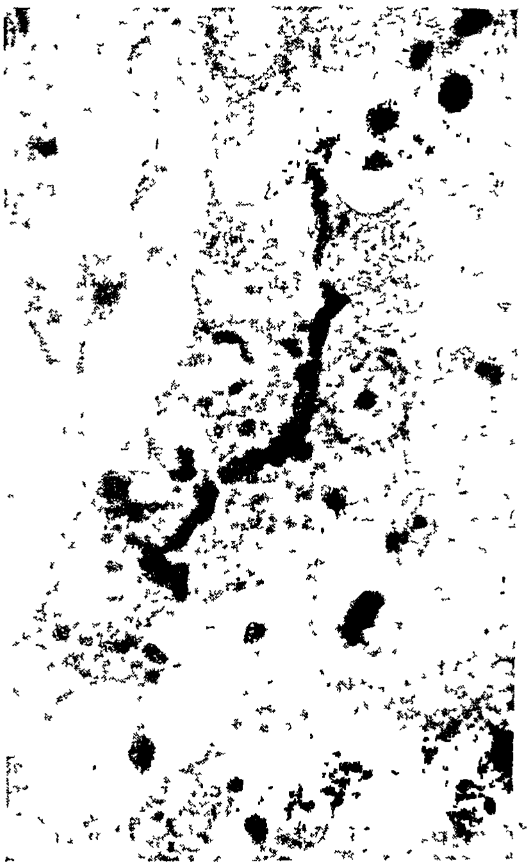

Fig. 10.—Arsenotherapy jaundice. Bile thrombi. Methylene-blue. (×1100)

The findings in this and other early cases have convinced us that the liver inflammation probably begins with the prodromal symptoms which are so often regarded as gastro-intestinal in origin.

Looking at our cases broadly, it appears that the acute and mild case of up to a week's duration is likely to show a lesion which is in the main limited to the portal zone, with but little destruction of the liver lobule. An acute and severe case is likely to show diffuse or mixed type of lesion with well-marked disorganisation of the lobular architecture, with marked degenerative changes in the hepatic cells and considerable histiocytic and leucocytic infiltration of the whole lobule.

We have insufficient data to enable us to follow with certainty the histological evolution of lesions of different degrees of severity from their earliest stages, but such as we have suggest that degeneration and autolysis are most severe in the early stages in the cells about the hepatic vein, and that the leucocytic and histiocytic reaction may proceed from the portal zones centrally.

With regard to the further evolution of the hepatitis, four possibilities are evident:

1. *Clinical recovery with complete restitution of the liver.*—The process of complete recovery is illustrated in figs. 1, 2 and 3. This very severe diffuse hepatitis passed to complete clinical recovery when a second biopsy showed a liver barely distinguishable from normal. A striking feature at the acute stage was the remarkable preservation of the reticulin framework of the liver lobule even in the midst of extensive disorganisation of the liver cells (fig. 2). It seems probable that this framework of reticulin provides a scaffolding on which the lobule is reconstructed when the liver cells regenerate.

2. *Continuous progress of the lesion leading to death, with, at autopsy, the picture of acute or subacute liver necrosis.*—The possibility of transition to the well-known pathological picture of acute liver necrosis of lesions such as those shown in figs. 1 and 4 needs no emphasis. Subacute necrosis is illustrated in fig. 9, which comes from a biopsy taken from one of our fatal cases.

CASE 7.—A man, aged 63, had been receiving arsenotherapy for neurosyphilis. Severe jaundice had developed 2 weeks before the biopsy was taken, and at the time of biopsy gross ascites and cholæmia were present. Gross destruction of the liver with microscopic islets of commencing nodular hyperplasia are seen in the section. At autopsy a typical picture of subacute necrosis was found.

3. *Development of liver cirrhosis.*—When the progress of the disease is more prolonged, and fibrotic changes become predominant, a picture of classical cirrhosis is produced. We have encountered two such cases, one in a patient under arsenotherapy, and the other in what appeared to be epidemic hepatitis in an elderly woman.

CASE 8.—A man, aged 29. Four months previously the patient had suffered from arsenotherapy jaundice with the development of ascites. There had been four abdominal paracenteses. Symptoms subsided in 2 months. On admission he was symptom-free. There was clubbing of the fingers. The liver was firm, with its edge 1 in. below the costal margin. The spleen was just palpable. The serum bilirubin was 0·2 mg. per 100 c.cm. The biopsy specimen showed the liver cells broken up into islets which assumed the circular adenomatous character of cirrhosis or "nodular hyperplasia," with well-formed bands of collagenous fibrous tissue surrounding them and some overgrowth of new bile-ducts. Fig. 11 shows the abnormal reticulin pattern with nodular hyperplasia and condensation of the fibres between the nodules.†

CASE 9.—A woman, aged 71, suffering from epidemic hepatitis. Prodromal gastrointestinal symptoms were followed by 5 months fluctuant jaundice. The liver was enlarged to the umbilicus. Serum bilirubin at the time of biopsy was 4·4 mg. per 100 c.cm. The jaundice subsided during the next 7 weeks and the patient has since been symptom-free. The biopsy shows a very chronic lesion with *the liver cells split up into groups by the fibrous tissue, early* nodular hyperplasia, and bile-duct proliferation in the fibrous portal tracts—i.e., a picture of cirrhosis (fig. 12).

4. *Mild residual fibrosis.*—In the process of healing a periportal zonal fibrosis obviously creates greater
obstacles to comple han the
diffuse lesion with frame-
work. Case 5 is of respect
(figs. 7 and 8). At in spite

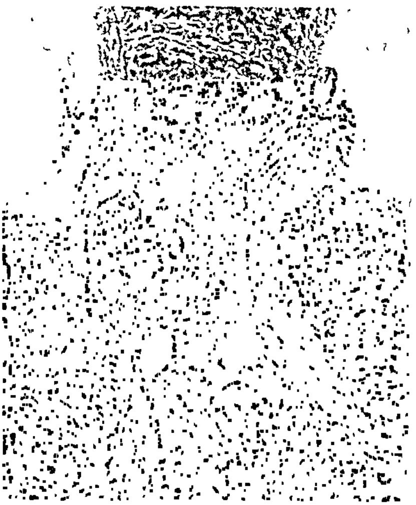
Fig 11.—Case 8 Cirrhosis following arsenotherapy jaundice. Foot's reticulin stain showing islets of liver cells isolated by fibrous tissue rich in reticulin fibres. (× 60)

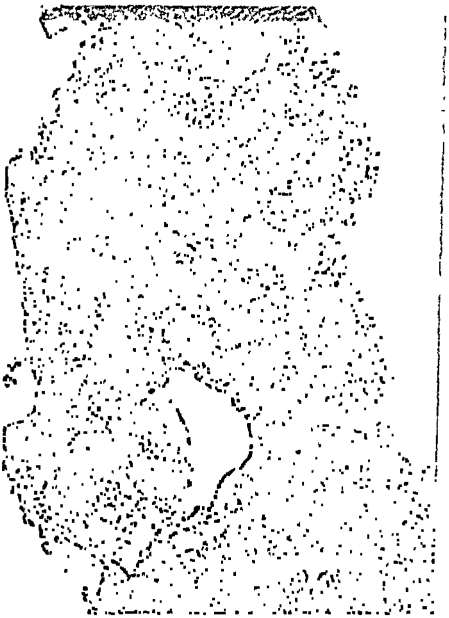
Fig 12.—Case 9 Epidemic hepatitis The picture is that of cirrhosis. Best's carmine stain. (× 45)

of the persistence of a little periportal scarring, the jaundice had already undergone complete cure. We have observed similar residual fibrotic lesions in the portal tracts in 9 cases, 21–51 days from the onset of the jaundice. All these cases ultimately recovered. We *have already mentioned the probable ultimate complete* resolution of this degree of fibrosis. The reversible fibrosis produced experimentally in animals by Cameron and Karunaratne (1936) may be recalled in this connexion.

DISCUSSION

The *question may be raised whether these small* biopsy specimens, of average size 2 × 20 mm., are representative of the liver as a whole. The sections usually enabled us to examine some 10 to 20 lobules, and while there is slight variety of intensity of inflammation, the histology is remarkably uniform in any one case. Our autopsy material supports this view. Pathologists, however, have not infrequently noted that in fatal cases the left lobe of the liver is more necrotic than the right (e.g., Stewart 1917).

Our material is in accord with the mass of evidence pointing to hepatitis as the pathological basis of epi-
dmann 1925, Gaskell
lm and Iversen 1939).
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of Vater by a plug
of mucus need no longer be considered. By intubation studies, Van Rooyen and Gordon (1942) found no evidence of duodeno-biliary catarrh.

The mechanism of production of icterus is a matter of some interest. The disruption of the liver-cell columns with their intercellular bile canaliculi may create a form of obstruction to bile flow. The isolation of liver cells may also lead to the excretion of bile into the surrounding tissue spaces. It is also obvious that the degree of damage may be such that the surviving liver cells are quantitatively inadequate to excrete the bile pigment brought in the blood-stream. Histologically, pigmented cells are seen especially at the centre of the lobule. Some of these are obviously necrotic, while others have lost their glycogen. The latter may accumulate bile because they are unable to excrete it, while the former become pigmented in consequence of their death. The affinity of dead tissue for bile is a common pathological phenomenon. Further out in the lobule we meet with "bile thrombi" (fig. 10), the finest intercellular canaliculi being filled with accumulated bile which has obviously failed to escape. There is an absence of evidence of any bile stasis in the interlobular branches of the bile-ducts, suggesting that, if any obstructive factor exists, it is intralobular.

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† Further reference to this case, with another photograph, is made in *Brit. Jour. ven. Dis.* (in the press).

The material studied has consisted of hospital cases which may be more severe than many milder cases treated at home. Our mildest and most transient case, however (case 6), had a very significant liver lesion. A striking feature has been the remarkable severity of the pathological picture. Several of the cases seem to have been verging on acute liver necrosis—12 out of 56 cases showed histological damage of more than 50% of liver cells—yet the normal course is to complete recovery. Fatal or permanent damage is rare.

The frequency with which a periportal "cirrhosis-like" picture is encountered leaves little doubt that it constitutes one pathological form of acute hepatitis. Roholm and Iversen (1939) also noted this appearance, but were uncertain whether it represented an old-standing hepatitis with jaundice resulting from an acute exacerbation. That acute and subacute necrosis and cirrhosis could follow epidemic hepatitis has been recognised previously (Bergstrand 1930, Cullinan 1936, Krarup and Roholm 1941). Our studies further emphasise this sequence.

The relationship of hepatitis to arsenotherapy and serum inoculations is discussed elsewhere (Dible and McMichael 1943, Hawley, McFarlan, McMichael and Dible 1943).

SUMMARY

The pathology of 56 cases of acute hepatitis has been studied by aspiration biopsy.

The inflammatory lesions may be diffuse, zonal or mixed. Jaundice persisting over 2 weeks is more likely to be due to a zonal lesion.

Diffuse hepatitis usually heals completely and rapidly. When the disease runs a longer course some residual fibrosis in the portal zones may still be present after apparent clinical cure.

We have found no evidence that there is a form of jaundice due to duodenal catarrh and obstruction of the common bile-duct by mucus.

The process of development of acute and subacute necrosis and cirrhosis has been followed.

No histological criteria have been found for the differentiation of the lesions resulting from epidemic hepatitis, arsenotherapy and serum inoculations.

We are indebted to the Medical Research Council for an expenses grant for technical assistance; to Brigadier T. E. Osmond and Major James Marshall for many of the cases of NAB jaundice; to Mr. J. R. Baker and Mr. J. C. Griffin for the histological preparations; to Mr. E. V. Willmott for the microphotographs; and to our colleagues in this school for their coöperation.

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BURNS TREATED WITH VIACUTAN

WITH SPECIAL REFERENCE TO THE FACE AND HANDS

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THE success of coagulation therapy with tannic acid is so well known as to need no reiteration. Tannic acid however has two disadvantages: (*a*) a contractile effect which makes its use hazardous in burns of the face and hands, and (*b*) its toxicity. Since we consider coagulation the method of choice, especially under war-time conditions, we have tried to eliminate these disadvantages.

The ideal substance for treating burns would be, in our opinion, a compound which would:—

(1) Penetrate the skin epithelium and coagulate tissue proteins sufficiently to prevent loss of fluid.

(2) Form a resistant yet flexible coagulum.

(3) Kill, or inhibit the growth of, organisms, not merely on the burnt surface but also in subjacent tissues.

(4) Form an aqueous solution with a low surface tension allowing it to flow into the folds of the skin.

These properties can be claimed for 'Viacutan,' which has been employed at Walsall General Hospital for over a year with excellent results. It is silver dinaphthylmethane disulphonate used as a 1% solution adjusted to a pH of 4·5. This solution possesses a slight brown fluorescence and remains stable when kept away from strong light.

ANTIBACTERIAL PROPERTIES

The antibacterial activity of viacutan was examined by the usual technique in broth cultures. Table I shows that it stops growth of these organisms in a dilution of 1 in 16,000. Phenol will not stop the growth of proteus in dilutions of less than 1 in 800; hence the bactericidal and bacteriostatic activity of viacutan against this organism is about 20 times that of pure phenol.

Its antibacterial activity was further examined in media consisting of (*a*) broth 90% and horse serum 10%, and (*b*) broth 50% and horse serum 50%. 1 c.cm. viacutan solution was added to 10 c.cm. of the medium and serial dilutions were then made. Each tube was inoculated with a loopful of *Staph. aureus* (24-hour culture) and incubated.

The results (table II) show that the presence of horse serum increases the bacteriostatic activity of viacutan. This is readily explained by the observation that viacutan gives a precipitate with broth but it does not give a precipitate with broth-serum medium.

The antibacterial activity of the substance was tested as follows in experimental burns:

Two burns, each about the size of a halfpenny, were made on a rabbit's back under anæsthesia and each was infected with *Staph. aureus*. One of these was used as a control and was covered with sterile gauze; the other was sprayed with viacutan three times during the day and covered with gauze soaked in viacutan during the intervals of spraying. After 24 hours the treated burn appeared dry, coagulated and healthy, whereas the control burn was exuding pus. Smears taken from the treated burn gave no colonies, whereas those taken from the control burn showed a heavy growth of staphylococcus when plated out in the usual way. At the end of 24 hours the control burn itself was treated by repeated applications of viacutan and then each burn was covered with gauze soaked in viacutan. Both healed in 8–11 days. (The control burn was treated after 24 hours with viacutan in order to spare suffering to the rabbit.)

PHARMACOLOGICAL PROPERTIES

Tanning effect.—Cubes of longissimus dorsi muscle of rabbit were immersed in the following solutions adjusted to pH 4 for 48 hours:

(*a*) Viacutan 1%; (*b*) tannic acid 1%; (*c*) distilled water. They were then separately suspended on waxed cotton in test-tubes containing 1% pepsin in N/100 hydrochloric acid and all the tubes were placed in the incubator.

After 5 days it was observed that:—

In (a) the muscle cube was unchanged and unattacked.

In (b) the muscle cube was unchanged and unattacked.

In (c) the muscle cube was almost completely dissolved.

This showed that viacutan coagulates protein sufficiently to resist lysis by proteolytic enzymes.

Velocity of penetration.—Similar cubes were immersed in 1% viacutan solution, and 1% tannic acid. They were examined after 12, 24 and 48 hours, and those immersed in viacutan were found to be white, resistant and slightly coagulated, but much less contracted and more flexible than those immersed in tannic acid. The viacutan preparations were sectioned and treated on a slide with metol-hydroquinone in order to change the silver present in the viacutan molecule into the metallic state and render it visible as a black marginal rim. The tannic-acid controls were similarly developed with ferric salts. After 48 hours' immersion in viacutan the depth of the black rim, measured with an eyepiece micrometer, was just over 3 mm., while after 48 hours in tannic acid it was of the order of 0·3 mm. This difference in the depth of the black rim remained constant in a series of sections examined, and it was concluded that the viacutan solution penetrates about 10 times as fast as tannic acid.

TABLE I—GROWTH OF VARIOUS ORGANISMS IN BROTH CULTURES CONTAINING VIACUTAN IN VARIOUS DILUTIONS

Dilution 1 in—	1000		2000		4000		8000		16,000		32,000	
Hours ..	24	48	24	48	24	48	24	48	24	48	24	48
S. pyogenes aureus ..	–	–	–	–	–	–	–	–	–	–	–	+
Bact. coli	–	–	–	–	–	–	–	–	–	–	–	+
Gaertner's bacillus ..	–	–	–	–	–	–	–	–	–	–	+	+
Proteus	–	–	–	–	–	–	–	–	–	–	+	+

Action on normal skin.—Areas of a rabbit's back were shaved. Half were treated with viacutan 1%, the other half with tannic acid 1%. The dressings were continuously saturated with the solutions for 36 hours, and were then removed, after which the areas were painted every 4 hours for a further 24 hours. The skin treated with viacutan was brown and harder than normal but was considerably more flexible than the skin treated with tannic acid. Microscopical examination revealed that the silver had penetrated to an average depth of 0·3 to 0·5 mm.; isolated deposits could be detected as deep as 1 mm. below the surface in the region of the hair follicles. Where the skin had previously been damaged by superficial cuts the penetration was not deeper than that in the undamaged skin. There were [illegible] silver by the blood and [illegible]

[illegible] of a rabbit's back were [illegible] hot oil. Half the burnt areas were treated with viacutan 1%, the other half with tannic acid 1%. Viacutan produced a coherent, flexible but resistant layer, not given to cracking. The contractile effect, and the scar tissue ultimately formed, were considerably less noticeable than with tannic acid; and regeneration of the tissue which was destroyed to varying depths was quicker than with tannic acid. When applied to the eye of a rabbit neither 1% viacutan nor 1% tannic acid produced coagulation or any noticeable damage to the cornea. In 2% strength the difference was conspicuous; the tannic acid caused corneal turbidity, conjunctival inflammation and mucopurulent discharge, but these were much less with viacutan.

TABLE II—GROWTH OF *Staph. aureus* IN SERUM MEDIA CONTAINING VIACUTAN IN VARIOUS DILUTIONS

Dilution in 1000ths—		8	16	32	64	125	250
Medium (a)	24 hours	–	–	–	–	+	++++
	48 hours	–	–	–	+++	++++	++++

Dilution in 1000ths—		8	16	32	64	125	250	500
Medium (b)	24 hours	–	–	–	–	–	++	++++
	48 hours	–	–	–	–	++	+++	++++

CLINICAL APPLICATION

All patients were given the same local treatment. Inpatients admitted because of the extent or site of the burns were given the usual general treatment, including morphine, heat, and fluids. With small burns preoperative morphine was found to be sufficient. With larger ones 'Pentothal Sodium' was the anæsthetic of choice for adults, and minimal ethyl chloride and ether, given by the open method, for children.

The routine of local application was as follows:—

The burnt area was cleaned with warm normal saline, the blisters were cut away and the raw surface was again washed with saline and dried. Viacutan was then painted on the whole area and surrounding normal skin.

Inpatients were returned to bed under a heat cage and further application was made 6–12 hours later. If moist areas were found at any time, more viacutan was applied. An electric hair-dryer was used to hasten the drying of the coagulum. A suitable alternative is the application of sterile powder, such as zinc oxide and starch or sulphanilamide.

For outpatients the viacutan was applied on a single layer of gauze mesh, and before bandaging this was left a short time to let it dry. The gauze could usually be removed in 24–48 hours without disturbing the coagulum, but if it was adherent it was allowed to remain.

The coagulum separates after 8 to 12 days, depending upon the severity of the burn. In several cases sterile pus—mainly tissue debris—caused separation of the central part of the coagulum after a few days, but there was no sign of inflammation and the time of healing was unaffected. Where parts of the burn were third degree the whole area was treated with viacutan. Epithelialisation of the small third-degree areas was rapid and there was so little scarring that skin-grafting was unnecessary.

These observations have been made in more than 80 cases, including many burns of the hands and face. The following are representative:—

OUTPATIENTS

CASE 1.—Aged 29. Several small scalds of back, second degree. Some were treated with viacutan and others with 'Tannafax.' The former healed in 10 days, whereas the tannafax coagulum was still adherent after 14 days.

CASE 2.—Aged 15. Second-degree burns of four fingers. Two were treated with viacutan, two with triple dye. The viacutan allowed more freedom of movement and the burns were healed in 10 days, compared with 14 days for the triple dye.

CASE 3.—Aged 23. Second-degree scalds extending over the whole volar aspect of the forearm. Healed in 9 days.

CASE 4.—Aged 4. First- and second-degree scalds of foot and dorsum of the ankle excluding the toes and part of the sole. Here the coagulum took 13 days to separate, the wound being completely healed.

CASE 5.—Aged 9 months. Second-degree burn of the distal half of the palm and the fingers to the 1st interphalangeal joints. Healed in 9 days with complete freedom of movement.

CASE 6.—Aged 13. Scalds of lower two-thirds of the anterior surface of the leg—second degree. Viacutan was applied on the two succeeding days; the eschar had separated and epithelialisation was complete in 8 days.

CASE 7.—Aged 20. *Mixed second- and third-degree burn* of the whole palm of the hand and volar aspect of wrist. Except for small areas of the third-degree burn on the thumb, healing was complete in 17 days.

INPATIENTS

CASE 8.—Aged 15. Second-degree burns of both hands. Right hand: burn extending from proximal interphalangeal joints dorsally over the hand to 3 inches above the wrist. Left hand: whole extent of dorsum of fingers to just above the wrist. The burns were 21 hours old and previously treated with flavine dressing, without removal of blister. Coagulum began to separate after 8 days; separation complete in 14 days, with immediate full movement of fingers.

CASE 9.—Aged 15. Second-degree burn of the whole of the right hand and forearm, to 2 inches above the elbow. Second-degree burn on the right side of face involving the ear. Viacutan applied three times during the first day, and to various moist small areas during the three following days. The eschar on face separated and epithelialisation was complete in 8 days. Movements of the arm were free throughout and the eschar separated after 11 days, leaving two small areas, one on the forearm and one on the wrist (third degree) which had still to heal. These were dressed with ung. zinc. oxid. et eucalypt. and were healed with a little scarring in a further 12 days. Absent from work 4½ weeks.

CASE 10.—Aged 1 year. Second-degree burn involving face, neck and right hand. Coagulum separated after 7 days leaving a small septic area on the neck. Viacutan was reapplied and healing was complete without any scarring, after a further 7 days.

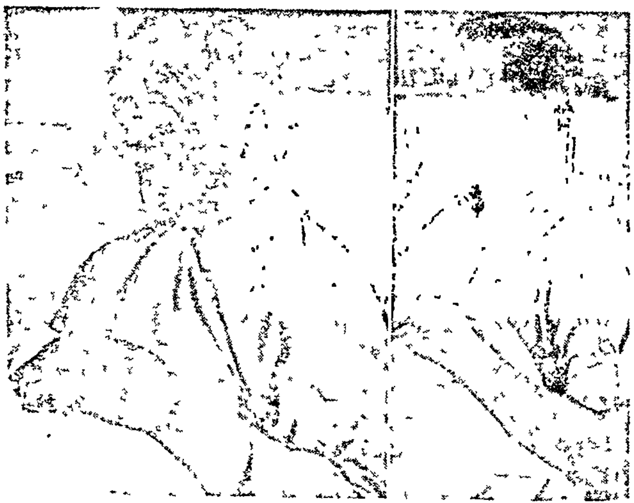
CASE 11.—Aged 40. Second-degree petrol burns of whole face, ears, neck and both hands to above the wrist. The coagula began to separate after 10 days. Separation was complete in the next two or three days, apart from the region of the lips and ears where healing took place in a further 10 days. There was no trace of scarring and the patient had immediate full movement of the affected part.

CASE 12.—Aged 16. Very extensive deep burns (second and third degree) of the whole right arm and shoulder girdle, whole right leg and buttocks and part of abdomen. Applications of viacutan resulted in a good coagulum and his condition improved considerably. After 10 days the coagulum on the second-degree areas commenced to separate; on the 15th day after the accident, the patient developed pneumonia and died.

CASE 13.—Aged 10. Scald of the back (2 × 3 in.) three days old and septic on admission. The coagulum started to separate after 7 days and there was complete healing in 11 days. Despite the sepsis, the initial treatment was as previously described.

CASE 14.—Aged 36. Second-degree petrol burns of both hands involving fingers and the forearm with small patches on the upper arms and right scapular region. First- and second-degree burns on the whole right side of the face. Separation began on the face after 5 days, and was complete in 12 days. The eschar separated from the hands and arms after 16 days. Complete healing without scarring. Discharged after 24 days.

CASE 15.—Aged 10 months. Second-degree scalds right side of face including eyelids, upper arm and part of chest. After 13 days the coagulum had separated and there was no scarring. In this case viacutan was instilled into the eye with no ill effects whatsoever.



Case 17—24 hours after first application. After three weeks.

CASE 16.—Aged 36. Second-degree burns both legs and right hand; third-degree burns, with separation of nails, involving the whole of the left hand and part of the right leg. All second-degree burns healed rapidly and the coagulum had separated in 16 days. The coagulum on the third-degree burns separated slowly by the accumulation of underlying sterile pus. After 4 weeks the coagulum was removed and zinc. oxid. et eucalypt. was applied. A fortnight later epithelialisation was complete with very little scarring. After 8 weeks he had regained practically full movement of the hand and fingers.

CASE 17.—Aged 38. Second-degree petrol burns, 6 hours old, of the whole face, left hand and part of the right hand. The coagulum on face separated completely in 17 days and that on the hands in a further 5 days. There was no scarring and the period of disability was 4 weeks. (See figure.)

CONCLUSIONS

In our experience silver dinaphthylmethane disulphonate ('Viacutan') has important advantages for the local treatment of burns: (1) It is easily applied. (2) It rapidly relieves pain. (3) After its application there is very little œdema or immobilisation of the affected part, and it can be used for the face and hands with complete safety. (4) Healing is quick and there is no subsequent scarring or disability. (5) The patient requires little supervision and there is no staining of linen and hands. (6) It is bactericidal and bacteriostatic.

These properties make it suitable for both first-aid and hospital treatment.

We would like to express our gratitude to Mr. Robert Forrest, group officer and surgeon, EMS, for his advice and helpful criticism.

The compound used in our investigation was supplied by Messrs. Ward, Blenkinsop & Co., Ltd. Dr. Pick has to thank Dr. A. A. Goldberg, director of the research department of that firm, for valuable suggestions for the biological trials, and Dr. M. Mandelbaum for performing the animal experiments.

THROMBOCYTOPENIC PURPURA

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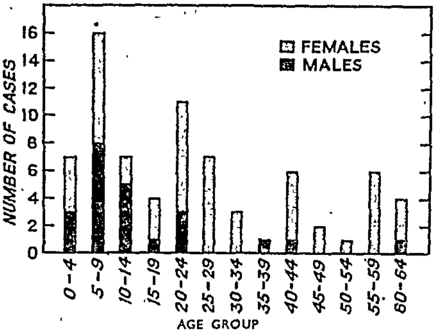
Thrombocytopenic purpura is a disease characterised by hæmorrhages from the mucous membranes into the skin and other organs, a reduced platelet-count, a prolonged bleeding-time and decreased capillary resistance but a normal coagulation-time. Patients admitted to the London Hospital with this disease during 1927–38 inclusive have been studied, and were followed up until the outbreak of war. Twelve have been further traced and had clinical and blood examinations in July, 1942. In all there were 75 cases, age and sex being as shown in figure and table A.

The disease is thus about evenly divided between the two sexes before the age of puberty; above that age there is a preponderance of 5 females to 1 male. There is a peak in early adult life and again at the menopause. The incidence of the disease in the first decade of life has been stressed by various writers; Rosenthal (1939) assessed it at 29% of the total, and Wintrobe and his colleagues (1937) at 36·2%; in the present series 30% of cases came in this decade. It is preferred here, however, to make the division at 15 years, as representing puberty, and in this series 40% occurred under that age.

PREPUBERAL GROUP

Of the 30 cases under 15 years, 5 could not be traced, 5 died as a direct result of the disease during the period of observation, 15 had no symptoms and no thrombocytopenia at the end of the period, and in 6 symptoms of thrombocytopenia persisted after 1939. The disease was observed to persist after the age of 15 in 2 boys and 2 girls. Of the fatal cases, 3 died with a subdural hæmorrhage, 1 with a severe hæmoptysis and 1 with a septic meningitis after chronic mastoiditis (table I).

The analysis shows that this is a serious disease, carrying a high mortality (16%). The presenting symptoms were: bleeding from the gums, 8 cases; epistaxis, 10; generalised purpura and ecchymoses, 16; hæmaturia, 4; melæna, 3; hæmoptysis, 1; hæmatemesis, 3; hæmarthrosis, 1; retinal hæmorrhage, 1; and subdural hæmorrhage, 3 cases. The bleeding may be severe—in 9 instances the red-cell count fell below 2 million per c.mm. and in one instance as low as a million. The platelets usually fall during an exacerbation to below 10,000 and the bleeding-time is prolonged to 30 minutes or more. In the chronic cases there may be remissions in which there are no symptoms, but the platelets rarely



Age and sex distribution in 75 cases of thrombocytopenic purpura.

TABLE A

Age in years		M.	F.	Age in years		M.	F.
0–15	0– 4 ..	3	4	Over 40	40–49 ..	1	7
	5– 9 ..	8	8		50–59 ..	..	7
	10–14 ..	5	2		60–69 ..	1	3
	Total ..	16	14		Total ..	2	17
16–34	15–19 ..	1	3				
	20–29 ..	3	15				
	30–39 ..	1	3				
	Total ..	5	21				

M = male ; F = female.

rise above 100,000 and the bleeding-time remains at 5 minutes or more. In most cases there was a moderate leucopenia with relative lymphocytosis.

Rosenthal (1939) found that 22 out of 58 cases under the age of 20 made a spontaneous recovery ; in our series 10 (5 of each sex) out of the 30 cases under 15 recovered spontaneously, the platelets rising and remaining at normal levels and the bleeding-time not being increased.

TABLE I—PREPUBERAL CASES

MALES

Age (years)	Cases	Persisted		Recovered		Died	Not traced
		Without splenec.	With splenec.	Without splenec.	With splenec.		
0– 4	3	..	..	2	1	..	..
5– 9	8	1*	..	3	1	2	1
10–15	5	1†	..	..	3	1	..
Total	16	2	..	5	5	3	1
FEMALES							
0– 4	4	..	1*	..	..	..	3
5– 9	8	..	3‡§	4	..	1§	1
10–15	2	..	..	1	..	1	..
Total	14	..	4	5	..	2	4
All cases	30	2	4	10	5	5	5

* To the age of 14. † To the age of 27. ‡ To ages 6, 7, and 24. § 1 year after splenectomy at age of 6. Splenec. = splenectomy.

POSTPUBERAL GROUP ; FEMALES

Females over 15 accounted for more than half of the cases admitted (38 out of 75). It is evident from tables I and II that the disease takes a much more severe form in women than in children : in women the mortality (16 *deaths in 38 cases) is extremely high and the likelihood of* spontaneous recovery extremely small (1 case out of 38). The ages given are those at which the patient was first seen, but in this group there was only one who dated her symptoms from before the age of 15—at 13 years. In

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addition of menorrhagia ; this was constant and severe in all cases arising before the menopause. In addition 3 cases showed retinal hæmorrhages, 1 a labyrinthine hæmorrhage, 1 jaundice, 3 headache, 1 jacksonian epilepsy and 1 aphasia.

Pohle (1939) has shown that the number of platelets in normal women slowly and progressively falls during the 14 days before menstruation and rapidly rises soon after its onset. It is not surprising, therefore, that severe

rominent feature of the

that the key to ætiology

Further evidence pointing in this direction is provided by a patient who became pregnant. During her pregnancy the symptoms gradually disappeared and in the eighth month her platelet-count was 770,000 and bleeding-time 2½ min. After delivery the symptoms reappeared and the platelets returned to their former low level. This is not a con-

after 4½ months. De Saussere and Townsend (1935) brought the total up to 55 and showed there was a mortality of 51%. Sanford, Leslie and Crane (1936) reported 11 instances in which the infant also manifested purpura. Williamson (1942) reported an established case of thrombocytopenic purpura in a woman whose platelets remained at 50,000 throughout gestation ; the baby had purpura with a platelet-count of 40,000 on the 14th day of life, but has been normal since. A woman reported by Urbanski and Hunter (1942), who had had thrombocytopenic purpura since the age of 14, had a stillbirth *and splenectomy was subsequently done ; after this she* had 3 live children, the first of whom showed signs of purpura for a short time ; the mother's platelets were low throughout.

Another pointer towards an endocrine origin of the disease is the relatively high incidence of thyrotoxicosis in women with thrombocytopenic purpura over the age of 40 (8 out of 17). Bomford and Rhoads (1941) drew attention to the association of the refractory anæmias with endocrine disturbances ; in their series there were 2 eunuchs and 2 patients with hyperthyroidism. In 4

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> "A working hypothesis of the ætiology of refractory anæmia is that the disorder is due to a conditioned susceptibility to toxic substances, usually exogenous or endogenous aromatic hydrocarbons, associated with hepatic disfunction, a failure of biochemical mechanisms of detoxication and the circulation of hæmolytic substances, and that these hæmolysins cause either an abnormal form of hæmolysis and thus an abnormal reaction in the marrow or that they destroy both circulating red cells and developing cells in the marrow thus producing hypoplasia and other abnormal forms of marrow."

The platelets are the first component of the blood to

(1928) wrote "the

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penic purpura sternal puncture (not used in the cases reviewed here because they were admitted to hospital before it was a common procedure) usually shows a marrow picture of erythroblastic and megakaryocytic hyperplasia ; but sometimes there is a considerable diminution of

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refractory anæmias. Generally speaking, the anæmia in thrombocytopenic purpura is more variable than that of aplastic anæmia and not so severe ; white cells, in particular the polymorphs, are not so greatly reduced, whereas the platelets are lower and the bleeding-time is longer. It is worth comparing the averages in this series of thrombocytopenic purpura with those in the four types of refractory anæmia published by Bomford and Rhoads (1941) (see table B).

TABLE B

Type		Red cells (million per c.mm.	Hb. %	White cells per c.mm.	Polys. %	Platelets per c.mm.
Refractory anæmia	1	1 8	40*	3640	54	169,000
	2	1 7	42	2250	40	58,000
	3	2 2	50	1850	20	79,000
	4	1 15	27	2013	38	304,000
Thrombo. purpura		2·7	57†	6860	57	27,000

* Estimated by Sahli's method.
† Before 1934 hæmoglobin estimations were made by Dare's method; after 1934 by photo-electric cell (Campbell Smith).

Occasionally in thrombocytopenic purpura there is a leucocytosis with an excess of lymphocytes; Minot (1936) drew attention to this and it was seen in 2 of our cases. The sex-distribution in the refractory anæmias recorded by Bomford and Rhoads was almost equal—type 1, 13 males to 17 females; type 2, 6 males to 5 females; type 3, 7 males to 5 females; type 4, 3 males to 1 female. Nevertheless, the mechanism which brings about refractory anæmia, working in milder degree and in females possibly only an exaggeration of a physiological process, may well bring about thrombocytopenic purpura.

POSTPUBERAL GROUP: MALE

The male group in this series is very small (table II). The manifestations in males seem to be much less severe than in females, but these 7 cases cannot be regarded as proving anything. There was only 1 death—from subdural hæmorrhage—which could be attributed to the disease; the other was an operative death from thyrotoxicosis in a man who had previously been cured of his thrombocytopenic purpura by splenectomy. There were 2 spontaneous recoveries. The symptoms were the same as those seen in childhood.

TABLE II—POSTPUBERAL GROUP

FEMALES

Ages	Cases	Dead	Subdural hæmorrhage	Spontaneous cure	Splenectomy				Unchanged	Thyrotoxicosis	Not traced
					Total	Cured	Op. deaths	Unchanged			
15–39 ..	21	7	1	..	9	4	2	3	6	..	2
40–69 ..	17	9	7	1	4	3	1	..	4	3	1
Totals ..	38	16	8	1	13	7	3	3	10	3	3

MALES

Ages	Cases	Dead	Subdural hæmorrhage	Spontaneous cure	Splenectomy Total	Splenectomy Cured	Splenectomy Op. deaths	Splenectomy Unchanged	Unchanged	Thyrotoxicosis	Not traced
15–39 ..	5	1*	..	1	2	2	..	..	1	1	1
40–69 ..	2	1	1	1	..	..	..	..	..	..	..
Totals ..	7	2	1	2	2	2	0	0	1	1	1
All cases ..	45	18	9	3	15	9	3	3	11	4	4

* Following thyroidectomy.

SECONDARY THROMBOCYTOPENIC PURPURA

Thrombocytopenic purpura may be a symptom of many conditions, among the most important being refractory anæmia, leuco-erythroblastic anæmia, leukæmia, and toxic reactions to drugs.

During the period of this study, 4 cases of leuco-erythroblastic anæmia presented themselves as thrombocytopenic purpura; at the time the differential diagnosis was extremely difficult, but in subsequent analysis it is noticed that in each instance there were 1% or 2% of myelocytes in the blood. An autopsy was performed in all 4 cases, and the primary carcinoma was found in the stomach in 3 and in the lung in 1. Thrombocytopenic purpura may be difficult to tell from leukæmia in the outpatient, but in this series a full blood-count soon differentiated between the two conditions. True thrombocytopenic purpura is a manifestation of poisoning various drugs, such as 'Sedormid,' neoarsphenamine, e, phenobarbitone and sulphathiazole. Of the full accounts of cases arising from sedormid the latest is by Moeschlin (1942). In the London Hospital between 1927 and 1938 there were 5 cases resulting from NAB, 2 from quinine (one from the drug given by mouth and one from quinine urethane used in treating varicose veins), and 2 from phenobarbitone. None of these 9 cases are included in the total of 75 idiopathic cases. Rosenfeld and Feldman (1942) and Werner (1942) each recorded a case following the use of sulphathiazole. The differential diagnosis is not difficult—there is a history of the drug having been taken, and immediately it is stopped the symptoms disappear and the platelets and bleeding-time return to normal. Here an exogenous toxin is probably acting for a limited period in the same way as does the endogenous aromatic hydrocarbon already described.

TREATMENT

Various forms of treatment were tried in this series. In 6 cases vitamin C was used in full dosage, as suggested by Engelkes (1935) and Vaughan (1937), but no improvement was observed as a result; this is not surprising since Finkle (1937) showed that there was no evidence of vitamin-C deficiency in thrombocytopenic purpura. Vitamin K was used in 2 cases but again no improvement was observed. Vitamin P of Szent-Gyorgyi (1936) was not tried. Witts (1931) has shown that liver therapy is unsuccessful, and no benefit was observed in the cases in this series where it was used. Deep X-ray irradiation was reported by Mettier, Stone and Purviance (1936) to achieve some success: but no improvement was reported by Davidson (1937), Vaughan (1937), Jones, Tocantins and Smith (1938) or Rosenthal (1939). Jennings and Castleden (1939) reported the case of a woman aged 33 in whom menorrhagia was the most prominent symptom and in whom splenectomy produced no benefit; they treated her with deep X-ray therapy and produced an artificial menopause. Deep X rays were not tried in the present series, and if our ideas on the ætiology are correct they would be not without danger. Rosenthal (1939) claims symptomatic improvement after the use of moccasin snake-venom, but has seen no change in the platelet-count or bleeding-time as a result of its use. This treatment was tried in 3 cases in the present series, but we were unable to observe any improvement, either symptomatic or in platelet-count or bleeding-time. Blood-transfusions with fresh blood carefully cross-grouped are a life-saving measure in severe cases, and are invaluable for preparing patients for splenectomy. Repeated small transfusions as used by Bomford and Rhoads (1941) in the treatment of refractory anæmia, however, seem to have no permanent effect on the course of the disease.

Berg and Rosenthal (1942) reported the failure of ligation of the splenic artery in 2 cases.

Splenectomy was first used in thrombocytopenic purpura by Kaznelson (1916) and since then has taken a prominent place in the treatment of the disease. Bedson (1924) showed that in animals splenectomy was followed for 48 hours by a rise in the platelet-count; this was maintained for 14 days and was followed by a gradual fall to normal in 3–4 weeks. It might be expected, therefore, that any improvement in the disease would be only temporary.

The spleen is not as a rule greatly enlarged: sometimes it is palpable, but usually not. The largest in this series weighed 1 lb. 7 oz. and the next 10½ oz. In 2 cases cholesterol ester histiocytosis in the pulp was reported.

Spence (1928) reviewed the results of splenectomy in the 101 cases of thrombocytopenic purpura published up till then and classified them as follows (table C).

TABLE C

—		Acute	Chronic	Unclassified	Total
Good results	No recurrences ..	2	61	6	69
	Improvement ..	..	6	..	6
Poor results		..	5	..	5
Deaths		10	8	3	21
Total		12	80	9	101

Of these cases, 24 were males (10 under 15 years) and 64 females (20 under 15 years); in the remaining 13 cases age and sex were unstated. In our classification the results would read: total, 101; cures, 69; operative deaths, 21; unchanged, 11. His division into acute and chronic seems very arbitrary; it depends on the extent of the hæmorrhage, which in women largely depends on menorrhagia. The disease is one of relapses and remissions closely related to the menstrual cycle. There seems, therefore, nothing to be gained by this division. These figures do suggest, however, that the most ill patients are the ones least likely to be benefited by splenectomy.

Eliasc ...ed a further 112 cases
to Sp ...f 213; of these, cures
were ...erable improvement in
8%. ... 13%. In their opinion
81% ... ration.

No attempt has been made to search for all the cases recorded since that time. Of the more important groups reported, Brown and Elliott (1936) studied 21 cases in which females predominated by 4 to 1; the results were as follows (table D).

TABLE D

—	With operation	Without operation	Total
Completely arrested	4	3	7
Much improved	4	0	4
Improved	1	2	3
Unimproved	0	5	5
Died	1	1	2
Total	10	11	21

very fully. There were 7 postoperative deaths, a mor-

and well, one died at the operation and one died later, possibly of a recurrence due to hyperplasia of the accessory spleen noted at operation but not removed. Witts (1942), in a description of ulcer of the leg in thrombocytopenic purpura, reports 2 cases
...ot result in cure
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to pass on particularly rapidly; in such patients they think *hæmolysis may be slowed* by splenectomy.

The results of splenectomy in the present series may be summarised as follows (table E).

TABLE E

MALES					FEMALES				
Age	No.	Cured	Op. deaths	Unchanged	Age	No.	Cured	Op. deaths	Unchanged
0–15	5	5	0	0	0–15	4	0	0	4
15–40	2	2	0	0	15–40	9	4	2	3
Over 40	0	0	0	0	Over 40	4	3	1	0
Total	7	7	0	0	*Total*	17	7	3	7

In the prepuberal group it was highly successful in the males, being performed 5 times with immediate and permanent cure in each instance, but in the females the only patients who showed persistence of the disease were the 4 who had had splenectomy; one case operated on remained thrombocytopenic but died of intercurrent infection a year later. It does not follow that removal of the spleen was responsible for the persistence of the disease in girls, since the operation was only performed on the severest cases, often with the aim of saving life; the figures do suggest, however, that there is a difference between the sexes as regards the effectiveness of splenectomy.

In the female postpuberal group splenectomy carries a high operative mortality (23%) with no certainty of cure. On the other hand, a cure did result in 7 of the 13 cases treated—and more often in patients over than under 40 years. In one case where it failed many spleniculi were present. It was performed on the most serious cases, often after repeated transfusions, as a life-saving measure. Both operative mortality and risk of not achieving cure (23%) have to be set against the ordinary mortality (under 40 33%, over 40 53%) and the risk of subdural hæmorrhage. One patient in this series, aged 46, recovered from her splenectomy and lost her symptoms, her platelets rose to 425,000 and bleeding-time fell to 1½ min.; but she died 3 months later from the subdural hæmorrhage which occurred before splenectomy was undertaken. In this group, splenectomy, it seems, should be undertaken only after due consideration; the best results are to be expected in older women. In the male postpuberal group there were 2 splenectomies with cure.

It is worthy of note that in the males, including children, the operative mortality in the whole series was nil, and the 7 splenectomies were all successful. Of the females less than half were cured. Nevertheless, in either sex splenectomy may be a life-saving measure, and is sometimes advisable in the hope of preventing subsequent subdural hæmorrhage.

SUMMARY

Of 75 cases of thrombocytopenic purpura treated at the London Hospital between 1927 and 1938, 30 occurred before puberty. These were equally divided between the sexes; *10 of them recovered spontaneously, splenectomy* was successful in 5 males and unsuccessful in 4 females, and the mortality during the period of observation was 10%.

Of the 45 cases which occurred after puberty, 38 were

hæmorrhage.

In the whole series splenectomy was successful in 7 out of 7 males and in 7 out of 17 females; there were 3 operative deaths; splenectomy may be a life-saving measure and is sometimes advisable in the hope of preventing subdural hæmorrhage.

One patient showed a striking improvement during pregnancy. Thyrotoxicosis was associated with the purpura in 4 cases.

We are indebted to the physicians and surgeons of the London Hospital for allowing us to follow up the patients under their care, and to Mr. A. E. Clark of the registrar's department for his help in searching the records and tracing the patients.

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TWO COMPLICATIONS WITH TRICHLORETHYLENE ANÆSTHESIA

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THE two noteworthy incidents here reported occurred among a series of some 175 minor or major operations under trichlorethylene ('Trilene') anæsthesia, in patients ranging in age from 2 months to 63 years. Except for the comparatively frequent occurrence of tachypnœa, the difficulty of obtaining deeper levels than III_1 (Guedel), and two cases of severe postoperative vomiting with transitory loss of taste, the remainder of the series was uneventful.

CASE 1

A healthy man of 22, very muscular and emotionally well-controlled, was admitted to the surgical outpatient department of the Royal Infirmary for reduction of a Pott's fracture. There was nothing peculiar either in his medical history or in his pre-anæsthetic clinical examination. No premedication was given. Induction with nitrous oxide and oxygen was smooth. Trilene from the chloroform bottle of the Boyle's machine was added to produce the necessary muscular relaxation. About ♏ 60 of trilene was used, and, except for a definite but transitory rise in respiratory rate without any cyanosis, anæsthesia seemed to be quite normal. When the manipulation was finished and the plaster applied, but not yet hardened, the patient was allowed to come out of the anæsthetic with the gas reduced and oxygen increased. Presently the patient started moving, and suddenly a few clonic convulsions of the hands and arms set in, followed by tonic convulsions and respiratory arrest. Cyanosis supervened rapidly, with trismus. An airway was inserted and artificial respiration with oxygen insufflation started without result. This stage might have lasted between 1 and 2 minutes. Then suddenly the fingernails blanched, the pulse, which up to then had been full and slow at 60 per minute (normal rate 66–70) and apparently regular, became impalpable, and the face became greyish. While nikethamide was being prepared for injection, the heart region was slapped with a cold wet towel. After this slapping had been done twice the heart restarted, the colour improved, and the pulse became palpable and returned to its normal rate within a few seconds. Oxygen was administered by rhythmical compression of the bag and the patient's normal colour was restored immediately. Nikethamide was not required. Oxygen was continued for another five minutes. Recovery of consciousness was slightly retarded. There was a little retching, but no actual vomiting and the patient was fully awake and dressed 20 minutes after all this had happened. He was kept in and observed for several hours and seen on frequent return visits. There were no after effects except for a slight headache within the first hour.

It is difficult to say whether the syncope in this case was due to anoxia of the heart muscle secondary to the convulsions and respiratory arrest, or to a primary chloroform-like action of trilene on the heart, either of them being able to cause or predispose to ventricular fibrillation. Any definite judgment on the effect of trilene on the conductive and automatic action of the heart in man must be postponed until routine electrocardiographic tracings have been made on a large number of cases under various operative procedures.

CASE 2

A child of 1½ years, coming to operation for inguinal hernia, premedicated with gr. 1½ of phenobarbitone and gr. 1/100 of atropine, was anæsthetised with nitrous oxide, oxygen and trilene, on the closed-circuit CO_2-absorption unit. A rash appeared during induction, which was so unusual that I sent a messenger to the ward to ask the nurse if any rash was observed when she was washing the patient; she had seen none. The spots were scattered on the abdomen and chest and fairly symmetrical on the front of both thighs. There was no tendency for the spots to run together, as in an ether rash, except slightly on the thighs. It was maculopapular in type, slightly raised, and did not disappear on pressure; the colour was brighter than that of an ether rash. On deepening the anæsthesia the rash disappeared gradually.

Schwartz and Russel,[1] reporting the effects of trichlorethylene on the skin, say: "It is also a sensitiser and can cause a more or less generalised acute eczematoid type of dermatitis, which begins as an erythema, becomes papular, then vesicular and is followed by oozing, crusting and desquamation."

I wish to thank Dr. John Gillies for his encouragement and advice; and Mr. J. F. Curr, Mr. A. R. Coe and Mr. A. B. Wallace for permission to publish the case-reports.

Medical Societies

ASSOCIATION OF CLINICAL PATHOLOGISTS

AT the summer meeting of the association held in Cambridge four of the papers, though embracing recent work by the authors, were essentially reviews of subjects of current importance.

Dr. **DOUGLAS McCLEAN** brought up to date the work on the part played by the "*spreading factor*" or mucolytic enzyme, hyaluronidase, in the decapsulation of streptococci (*J. Path. Bact.* 1942, **54**, 284), in fertilisation (*Nature, Lond.* 1942, **150**, 627), and in the early diagnosis of anaerobic wound infection (*Lancet*, 1943, i, 355, 707).

Dr. C. H. **ANDREWES**, FRS, spoke on *typhus*, and divided the varieties of the disease into three groups. (1) Type OX19 includes classical typhus, endemic typhus, Mexican typhus, Brill's disease and shop typhus (Malaya), with the louse and rat flea as vectors, and all giving good agglutination with OX19 but very little or none with OX2 or OXK. (2) Type XK includes tsutsugamushi, scrub typhus (Malaya), mite fever (East Indies), with the mite as vector, and agglutinating well with OXK but not with the other two antigens. (3) Type undetermined includes Rocky Mountain spotted fever, Sao Paulo typhus, fièvre boutonneuse, tick-borne typhus of South Africa, India, Kenya, all carried by ticks and giving poor agglutination with all three classical antigens. He mentioned the latest League of Nations survey (*Bull. Hlth Org. LoN*, 1943, **10**, No. 1).—Major **JOHN BOYCOTT** gave some details of typhus in Ireland.

Dr. P. L. **MOLLISON** discussed the *interpretation of Rh tests*. So far 88 mothers whose infants were affected with hæmolytic disease had been tested. Of these, 85 were Rh-negative and only 3 Rh-positive. Anti-Rh agglutinins were found in the sera of 82 of the 85 Rh-negative women. In these cases the peak of the immune response to the Rh agglutinogen was usually reached between the fifth and twentieth days after delivery, and this was therefore the most favourable time for examination. In 2 of the cases in which the mother was Rh-positive the destruction of the fœtal erythrocytes was apparently due to very potent immune anti-B agglutinins.—Dr. **GERTRUD PLAUT** dealt with the clinical importance of the Rh factor, and Dr. G. L. **TAYLOR** demonstrated the technique.—In the discussion Dr. E. N. **ALLOTT** asked whether there was any genetic linkage in the inheritance of the ABO and Rh groups; Dr. **MOLLISON** replied there was none.—Dr. F. A. **KNOTT** showed a series of tables summarising *methods and media for the detection of pathogenic anaerobes*. The use of Fe media, neutralisation of sulphonamide and suppression of contaminants, media giving good growth without anaerobe jars, and methods of identifying the specific toxins, all help to detect the presence of pathogenic strains without first going through the time-consuming process of isolating pure cultures. The early detection of hæmolysin and of ferments such as lecithinase and hyaluronidase may give a valuable early indication whether infection is likely to spread. The results in

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DR. EVANS, DR. PERRY: REFERENCES (*continued*)

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[1] Schwartz, L. and Russel, J. P. *Publ. Hlth Rep., Wash.* 1941, **56**, 1581.

animal work give promise of value in the management of wounds in man. Dr. Knott stressed the usefulness of the revised edition of the MRC War Memo No. 2 (Diagnosis and Treatment of Gas Gangrene) to workers in this field.

Dr. O. C. **Lloyd**, who showed about 20 sections of *endometrium*, both normal and pathological, said that *bio*[illegible] abortion and of mal[illegible] and menorrhagia. In t[illegible] to have a biopsy between the 18th and 20th day of the cycle, for early secretory differentiation may reveal relative deficiency of the action of the luteinising hormone on the endometrium.

Colonel **Joseph Turner**, USAMC, described the development of *cold agglutinins for human red cells in atypical pneumonia*, when no pathogenic microbe or virus can be demonstrated and there is little or no leucocytosis. The tubes are kept in the ice-box overnight before reading; an agglutinin titre of 1 : 2000 after 16–18 days has been recorded. The titre persists well into convalescence and is not affected by sulphonamide treatment.

Dr. **Joseph Ungar** described the *immunisation of animals with TAB bacilli* grown on synthetic media. No correlation was found between the degree of local or general reaction and the level of serological response, blood groups or Forssman's hæmolysin. He said that [illegible] *in wet* [illegible] watery [illegible] Experience is necessary for identification. In 178 cases, carcinoma was diagnosed 100 times. Malignant cells were missed 18 times and a correct diagnosis was made 85 times.—Dr. **D'Arcy Hart**, on behalf of the MRC, asked for specimens of tuberculous tissue or pus likely to contain bovine bacilli, for a combined inquiry into the incidence of bovine tuberculosis in the community.

Dr. F. **Duran-Jorda** discussed the formation of red blood-cells (*Lancet* 1943, i, 513; 1943, ii, 180).

Squadron-Leader E. M. **Darmady** has found the *intravenous hippuric acid test* useful in differentiating toxic goitre from anxiety neurosis. The serial test in jaundice gives a satisfactory estimate of probable damage which is useful in prognosis and treatment. It is essential to use a two-hour reading. The estimation of hippuric acid as modified by Prorstein is imperative for comparable readings.

Dr. E. N. **Davey** showed specimens from a baby seven weeks old, which had developed during life a slough from thigh to navel and also behind the ear. The mother, who was Schick-negative, yielded the same type of *C. diphtheriæ* as that obtained from the child's lesions, the mother being infected in nose, throat and vagina. Apparently the child was protected by the maternal antitoxin in the milk so long as it was breast-fed. It died nine days after the cessation of breast-feeding.

Mr. L. J. **Harris**, DSC, demonstrated the *vitamin balance* in certain conditions. In pneumonia and particularly in convalescence vitamin A is needed in large quantities; during lactation the mother excretes daily in the milk a large amount of vitamin A.

New Inventions

SCREW LENGTH IN BONE GRAFTING

It is often difficult during bone-grafting and plating operations to estimate the correct length of screw needed to reach exactly to the further cortex of the bone. A simple instrument has therefore been devised for measuring this accurately. It consists of a stilette, notched near the tip rather like a crochet hook, and a sliding pointer which indicates on a scale the depth of the drill hole prepared for the screw (fig. 1).

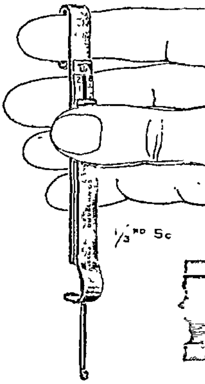


Fig. 1

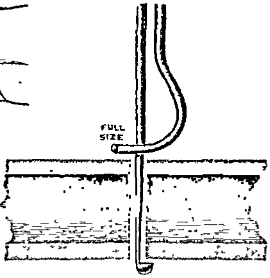


Fig. 2

The stilette is passed through the drill hole and the notch is made to engage on the distal surface of the bone (fig. 2). The sliding piece is then brought into contact with the graft or plate, held in the correct position by clamps. The depth of the drill hole can now be read off on the scale, and the correct length of screw chosen accordingly.

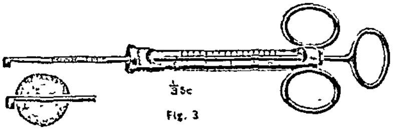


Fig. 3

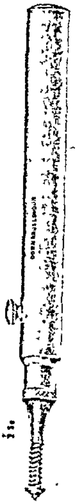
This instrument has proved simple and effective in practice. It has the advantage that no disturbance of the bone or soft tissues is necessary, as is the case with most of the other methods in use.

The makers are Messrs. Down Brothers, Ltd., of 22a, Cavendish Square, London, W.1, who have also made a simplified two-piece modification, easily dismantled for cleaning (fig. 3).

J. **Crawford Adams**, MD LOND, FRCS
Squadron-Leader RAFVR

PUNCH FOR USE IN PLATING FRACTURES

In the mechanics of bone surgery many problems arise which could be readily solved by mechanical [illegible] a simple instrument which I have seen used by engineers and which will solve one small diffi[illegible] special [illegible] neces[illegible]sertion [illegible] in the [illegible]entred, drills may cut eccentric holes, thus not only damaging the edges of the metal plate but also giving the screw an imperfect hold upon the plate.



The instrument illustrated is a spring-loaded punch, sold to t[illegible] trade-name of '[illegible] for making the [illegible] bone. Pressure on the handle releases a spring, the tension of which is adjustable; the point of the instrument then makes a small hollow in [illegible]ed. [illegible] to [illegible]ne-plate screw-hole and ensures that the point of the punch is centred accurately. A lengthening handle has also been attached, which enables the instrument to be used with less risk of the surgeon's hand coming in contact with the wound. When the fracture has been reduced and the metal plate is firmly applied and held in position, it is a matter of seconds to punch accurately six or eight drill points; with an electric power drill the most tedious part of the operation is then very quickly and efficiently performed.

I am indebted to Mr. H. Guy Drew, of Messrs. Down Bros., for his help.

Norman Capener, FRCS

Reviews of Books

Beyond the Microscope

KENNETH M. SMITH, FRS, director of the plant virus research station at Cambridge University. (Pelican book. Pp. 110. 9*d.*)

Dr. Kenneth Smith is an authority on plant viruses and has made himself familiar with recent work on those attacking man and other animals. He has succeeded in writing a popular account of viruses which should be enjoyed by doctors as well as laymen. He has the journalist's eye for the dramatic—and the story of recent work on viruses abounds in drama. Thomas à Becket's lice, psittacosis in fulmar petrels in the Faeroes, vampire bats which carry rabies, the effect of cigarette smoking on diseases of tomatoes, the hidden reservoirs of jungle yellow fever, the relations between viruses and insects (and even earthworms), virus crystals—these are some of the excitements you can savour for a mere ninepence: the shilling shocker is nothing to it. With all this, Dr. Smith has his facts accurate, though he may occasionally be rash in trying to be too up to date. The recent claim from America that the influenza virus is only 15 millimicrons across has by no means been accepted by all workers; yet he quotes it *as established fact*. There is a chapter on viruses and tumours, and to finish with a fair summary of various modern views as to what viruses are.

Outlines of Industrial Medicine, Legislation and Hygiene

JAMES BURNET, MD EDIN., LL B LOND., FRCPE, lecturer on diseases of children, School of Medicine of the Royal Colleges, Edinburgh. (Wright. Pp. 87. 7*s.* 6*d.*)

Dr. Burnet insists that his book is an introduction and not a treatise. The legal sections cover briefly the Factories Act, with the history of factory legislation, the Workmen's Compensation Acts, and the Truck Acts. The whole book has what might be called a compensation bias, because even the sections on industrial diseases are built mainly on the schedule of compensable diseases, and they are therefore incomplete. The most original chapter deals with incapacity for work and could be studied with advantage by all who give medical certificates to factory workers. Some of the information given about industrial diseases is not up to date. For instance it was true 30 years ago that there was a "considerable amount of lead poisoning" among file cutters, but it is not true today when most files are cut by machine. Again, plumbers do not contract lead poisoning simply by handling lead pipes and sheet metal. In the section on scrotal epithelioma, reference is made to chimney-sweeps, but not to the more commonly affected mule-spinners. The book is well arranged and attractively printed.

Year Book of Obstetrics and Gynecology 1942

Editor: J. P. GREENHILL, MD, FACS, professor of obstetrics and gynecology, Loyola University. (Year Book Publishers; Lewis. Pp. 672. 19*s.*)

SINCE the death of Joseph B. De Lee the editorship of this useful and important book has been taken over by Professor Greenhill, who has maintained the standard of previous years. The format remains the same, the first part being devoted to obstetrics and the second to gynæcology. Epitomes of the year's papers are preceded by a brief memoir of De Lee. If the abstracts are a little less crystalline than they were, the editorial notes are as illuminating and balanced as when they came from the pen of De Lee himself—and this is no mean tribute to the present editor.

Tests for Colour Blindness

(9th ed.) SHINOBU ISHIHARA, professor of ophthalmology, Imperial University of Tokio. (Lewis. Plates 32. 50*s.*)

COLOUR blindness may be congenital; or it may be acquired, chiefly in association with conditions like tobacco blindness and optic atrophy. Of the congenitally colour blind the overwhelming majority are red-green blind only. The totally colour blind are easily distinguished, for they have nystagmus and defects of central vision as well. Dr. Ishihara's series of plates, first published in 1925, was devised as a quick and accurate method of detecting the congenitally red-green blind. It proved so successful that it was adopted by the Services and transport organisations as one of their standard tests, and has now passed through nine editions. It has now been reprinted in response to a demand from all three Services. The plates form such a delicate test that 10% of the male population are unable to answer them all correctly, and there is no doubt that the standard of colour vision required by them is higher than many branches of the Services desire. It is invaluable in weeding out all who have some colour vision defect, but it is often permissible to re-examine the failures on the Archer lamp or Edridge-Green lantern, when a number of the candidates will be found to have sufficiently good colour vision for the purpose in hand. Though this was not the first book of its kind on the market, it has proved the most successful, and Dr. Ishihara is to be congratulated on producing a quick test, easy to handle, in which the elements of luck and chance are absent.

Creatine and Creatinine Metabolism

HOWARD H. BEARD, PH D, professor and director of the department of biochemistry, Louisiana State University, New Orleans. (Chemical Publishing Co. Pp. 376. $4.)

Professor Beard has in his own words attempted to deal with the following topics: carbohydrate metabolism, muscular contraction, phosphate bond energy, phosphorylation and respiration, physical fitness, nutritional muscular dystrophy, the vitamins and hormones, and creatine-creatinine metabolism in the myopathies and diseases of the heart. Parts of his book are excellent. He has done a good deal of work on the metabolism of creatine and creatinine and the whole presentation has a pleasant personal flavour; yet no-one can accuse him of neglecting the efforts of other people, for he gives many data from other workers, a list of previous reviews, and some 900 references. His views on the ways in which radio-active nitrogen has been used (or abused) are much to the point, but there is some strange reading in the chapter on the "origin" of creatine and perhaps the section on the creatinine clearance was a mistake, since it may mislead those who do not know recent work on the measurement of glomerular filtration rate and the physiology of the kidney.

First Aid in the Royal Navy

(H.M. Stationery Office. Pp. 106. 2*s.*)

THE Navy have their own way of doing things and needless to say their methods are efficient. In many points this little book—which has been prepared for seamen in general and not only for medical or sick-bay personnel—differs from classical practice, and most of these differences might well be more widely known. For example, in the general rules for the treatment of unconsciousness, the patient is put in the prone position, so that the tongue cannot fall back into the throat. Useful hints are given on the treatment of fractures, and on transport of casualties. Most teachers, however, will feel that half an hour is too long to leave on a tourniquet. The direct style makes it intelligible to ordinary people and adds to its worth. Some of the photographic illustrations are below standard for a Government publication.

Statistical Tables for Biological, Agricultural and Medical Research

(2nd ed.) R. A. FISHER, SC D, FRS; FRANK YATES, SC D. (Oliver and Boyd. Pp. 98. 13*s.* 6*d.*)

IN this edition of a collection of tables which have proved their value to statisticians a few corrections have been made and some useful additions inserted. The latter include two tables for testing the significance of the difference between two means for which the errors are due to different causes, so that estimates of the variance cannot properly be pooled; a table for assigning the limits for the probability of an event; and one for estimating the number of organisms of a given type present in a medium by means of the dilution method, by which the presence or absence of the organism can be determined but in which counts cannot be made. Examples of the use of these and other tables are given clearly in the introduction and, as in the previous edition, the tables are beautifully spaced and printed.

THE LANCET

LONDON: SATURDAY, OCTOBER 2, 1943

MEDICINE AND THE COMMUNITY

ADDRESSING the Representative Body of the British Medical Association last week, Mr. SOUTTAR, chairman of council, said that if the vast possibilities of postwar medicine are to be realised we shall need wisdom, patience and self-sacrifice. To these static properties he might have added others more dynamic—faith and hope. If motive force is the criterion, the Representative Meeting fell short of success. Its intentions and its conduct were estimable, but its members, for obvious reasons, were unduly tired and unduly grey, and their attitude was correspondingly negative. Their minds were not fixed on the possibilities of which Mr. SOUTTAR spoke—on the opportunity to make medical knowledge far more effective than it is today. Nor was there any sense of urgency: the prospect of a shortage of doctors was taken as a reason for postponing reorganisation rather than a reason for hastening it so as to make more economical use of medical resources. In their determination to be realistic the representatives seem to have lost touch with the larger realities—and with the public. Extension of National Health Insurance to dependants, with addition of specialist services, would have been accepted as a great advance five years ago. Today it fails to ring the bell. "The panel," with all its merits, has never inspired more than modified rapture, and nobody would now regard its limited extensión as an instalment of the new social order on which so many have set their hearts. It is unrealistic to ignore the fact that war experiences, not only in the Forces but in every town and village, have bred a new feeling of equality, and that this feeling demands expression. Leaders of our profession accuse the Government of acting on "political expediency" when it seeks to introduce a comprehensive medical service available equally to all citizens. No doubt they are right; but governments, like anyone else, must attend to what is expedient. The Government presumably understands that by establishing such a service immediately after the war it would meet a deep emotional need. To put every man, woman and child in the country on exactly the same footing for essential medical care might be an act not only of political expediency but of high political wisdom. If that is so—and Parliament will decide—little importance attaches to the opinion of a professional body that inclusion of the whole community in the service is "unnecessary."

Against any disappointment should be set the choice as president of a man identified since 1920 with the cause of medical reform. Lord DAWSON'S speech, published on another page, fulfilled the presidential function to perfection. It brought to the meeting a breath of the outside world, a reminder of greater issues. Not for the first time, the speaker showed his awareness that our basic task in framing medical services is to find a mean between "community direction" and "individualism." To achieve a balance between them is indeed the ever-recurring task of all statesmen. Touching the variations of emphasis between Individual Absoluteness and Individual Relativity the philosopher A. N. WHITEHEAD wrote:—

> In one of thei[illegible] the antagonism [illegible] organisation. I[illegible] importance to h[illegible] its notion of ideal ends within the range of practicability, depends largely upon those various patches of activity within which one or the other of these notions, individual absoluteness or individual relativity, is dominant for that epoch. . . . Frequently the shifting of emphasis is to be ascribed to the general tendency to revolt from the immediate past. . . More often changes in the social pattern of intellectual emphasis arise from a shift of power from one class or group of classes, to another class or group of classes. For example, an oligarchic aristocratic government and a democratic [illegible] may each tend to emphasi[illegible] is to say, the relativity o[illegible]. But governments mainly [illegible] professional classes, whether nominally they be aristocratic, democratic, or absolute, emphasise personal freedom, that is to say, individual absoluteness.

Medicine must take account of an evident shift of emphasis, in our time, towards social organisation. The tendency may be desirable or undesirable; but it exists. The consequence for us must be restriction of individual practice in favour of coöperative practice, and it is inevitable that coördination should mean more control. When Dr. DAIN, chairman-elect of council, bids the BMA stand on the right to practise "where we like and how we like," he reveals sympathy with the past rather than the future.

Nevertheless the word "control" has an ugly sound for those who take pride in doing their best work for the sake of that work. Control, while improving the forms of medical service, might destroy its spirit; and in moving with the times we must contrive to keep the sense of personal responsibility that we have inherited. Personal responsibility to patients is vital to practice, and additions to the corporate responsibilities of the profession would enhance its value to the nation. To most of us, therefore, the idea of a National Health Corporation, in which doctors could play their part under a minimum of political control, is peculiarly attractive: for the profession it might offer an acceptable form of partnership between "the community" on the one hand and "individual effort" on the other. The Representative Body, impressed by the arguments of Dr. GRAY, decided that a corporate body shall now be the association's goal; and, if this does not exclude alternative interim solutions, we certainly shall not quarrel with their decision. A few months ago, however, we expressed doubt whether it will prove politically possible to entrust a comprehensive service to a corporation. We still have doubts, and it appeared that Professor PICKEN, spokesman of the BMA council, shares them. Like him, we are less concerned with a particular solution—an all-or-none policy—than with finding means by which a comprehensive service can be got going in the reasonably near future without sacrificing essential principles. Not quite all the principles now wedded by the BMA belong to this class.

PATHOGENESIS OF JAUNDICE

A LONG step forward in the study of a pathological process is taken when the microscope demonstrates its successive stages and the various ways in which it may evolve. Such histological studies are seldom possible in the case of a rarely fatal process affecting an internal organ. Acute hepatitis is a case in point, but IVERSEN and ROHOLM showed that liver biopsy is a practicable[1] and informative[2] procedure. Their technique has been used, and their observations extended by DIBLE, MCMICHAEL and SHERLOCK who report a first instalment of their own findings on an earlier page. It should be noted in passing that they do not recommend liver puncture as a routine procedure; it is not without risk of internal bleeding, especially in jaundiced patients. The basic findings were degeneration of liver cells coupled with infiltration of leucocytes and histiocytes. Cellular necrosis and autolysis was most marked in the centres of the lobules and seemed to spread outwards, whereas the infiltration was greatest in the portal tracts and spread inwards. In a mild case during the first week of jaundice, and generally in favourable cases, the periportal infiltration predominated, giving a "zonal" type of change. Severe cases presented early a "diffuse" type of change, with more pronounced cell necrosis and more widespread infiltration. There was no reason to regard these differences as fundamental, since an intermediate "mixed" type of lesion was also found. Four possible end-results of hepatitis are described. Recovery with complete restitution may follow even very severe lesions, for regeneration is assisted by the preservation of the reticulin framework of the liver in the diffuse type of change. The lesion may progress to a fatal issue with acute or subacute hepatic necrosis. When the disease is prolonged, fibrotic changes may give rise to a classical cirrhosis. Or a mild residual fibrosis may persist for some time after the zonal type of lesion, probably clearing up completely later.

Several points of interest arise from the biopsy findings. There was no evidence of bile stasis in the interlobular ducts, and it must be accepted that the pathological basis of epidemic jaundice is hepatitis and not biliary obstruction due to a plug of mucus in the papilla of Vater or an ascending cholangitis. This conclusion is also supported by the demonstration that liver inflammation has begun at the time of prodromal symptoms hitherto regarded as gastro-intestinal in origin. No histological differences were observed between cases of epidemic jaundice and those in which jaundice followed arsenotherapy or injections of human serum or plasma. This apparent histological identity does not, the authors state, imply that the same ætiological factor is concerned. The biopsy material illustrates how acute hepatitis may progress to acute or subacute liver atrophy or to cirrhosis, and that periportal "cirrhosis-like" infiltrations constitute one form of acute hepatitis.

These fundamental studies will interest especially those who are engaged in investigating hepatitis at the present time. CAMERON has reported[3] on work done by himself and others in Palestine. Clinical findings in cases of hepatitis among British troops were similar to those described in epidemic hepatitis elsewhere, as were the pathological findings in one biopsy and four fatal cases. In many of their cases the incubation period was prolonged and the onset was precipitated by a secondary factor, such as alcohol, intercurrent illness, chill, low diet or the fatigue of active service. Unsuccessful attempts were made to transmit infection by inoculating whole blood or leucocytes into monkey, dog, guineapig, mouse, rat or hamster. Suggestive results were obtained in human volunteers inoculated with one or two c.cm. of blood from cases of infective hepatitis. One volunteer developed a typical attack of hepatitis 30 days after inoculation, and five of the other six volunteers are known to have developed jaundice within 6 months. During this period there were other cases of hepatitis in the unit to which the volunteers were posted, so that, as the authors admit, the experiment was not conclusive. VOEGT[4] however claimed to have produced jaundice in human volunteers with injections of serum from cases of infective hepatitis, and CAMERON'S experiments strengthen the supposition that there is an icterogenic agent in the blood of early cases. VOEGT also had some success with duodenal juice which was drunk by volunteers, and FINDLAY and MARTIN[5] have induced jaundice in human volunteers by intranasal instillation of nasopharyngeal washings from men who had hepatitis after inoculation against yellow fever.

Evidence is thus accumulating that icterogenic agents are present in blood, nasopharyngeal washings and duodenal juice of cases of hepatitis. Only after their successful isolation will it be possible to fix the responsibility on particular agents for the hepatitis of epidemic, arsenotherapy and serum jaundice. In the meantime clinical, biochemical and epidemiological investigations may yield information that will aid diagnosis, treatment and control of the condition.

DISPOSAL OF REFUSE

THE evacuation of Watford Isolation Hospital necessitated by flies alleged to come from a nearby corporation dump may lead to litigation, but the hospital belongs to a joint board on which the town council is well represented, and the dump is the property of the corporation, so there seems no sense in loading the citizens with legal expenses. The law on the subject is clear—a corporate body has no more right than a private citizen to create a nuisance—so if the alleged offence is proved the board can obtain an injunction against the corporation. But if the corporation is compelled to abandon the dump it must find another way of dealing with its refuse. It may astonish the modern generation that the hospital was built next to the dump, or vice versa; but it was a common practice in the early days of fever hospitals to put them in out of the way corners away from respectable property, and pest-houses and pestiferous dumps were considered appropriate neighbours.

Household refuse collection and disposal in this country has never satisfied public health requirements, for tipping and incineration, the only common forms of disposal, are both objectionable. Paris and some other cities had methods of disposal which are profitable and harmless, but until the war we paid little attention to possible profit from refuse.

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[1] Iversen, P. and Roholm, K *Acta med. scand.* 1939, **102**, 1.
[2] Roholm, K. and Iversen, P. *Acta path. microbiol. scand.* 1939, **16**, 427.
[3] Cameron, J. D. S. *Quart. J. Med.* 1943, **12**, 139.
[4] Voegt, H. *Münch. med. Wsch.* 1942, **89**, 76.
[5] Findlay, G. M. and Martin, N. H. *Lancet*, 1943, i, 678.

and cheap and nasty methods were the rule. The war has shown how domestic rubbish can be collected and disposed of profitably without offence, and if war-time methods can be continued and extended in peace the problem will be solved. The dangers of refuse arise mainly from the decay of organic matter; if this can be separated from the rest and got rid of expeditiously, health will be satisfied. During the war there is comparatively little kitchen waste and that is used for feeding pigs and poultry. It is doubtful whether the conversion of offal into human food will continue after the war, and moreover we shall have a return of orange peel, banana skins and the like, of no value for animal feeding. Yet if organic waste is kept separate and dry it can be used as fuel and still be an asset. Health officers have tried hard and long to get people to burn their animal and vegetable refuse in their own grates, but with little success, and we must expect even less success in future if grates and stoves which burn raw fuel are superseded by gas and electric fires. In the country, householders can use their organic refuse as compost for their gardens, but this is impracticable in towns. Townspeople might agree to reserve one small bin for their putrefiable waste if such bins were part of the standard equipment of all houses. Collection would be neither difficult nor unpleasant and the material could be burnt in utility plants. The system of a specially designed sink, which was installed in some flats in Leeds, works well and is perhaps the best way of getting rid of refuse from flats in cities, but to be successful it must be used with intelligence. Outside large towns, tipping will no doubt continue for many years whatever is said against it; if trench tipping is adopted it can be made largely inoffensive, but this calls for much land and labour which small sanitary authorities are reluctant to supply. The dump is unsightly, harbours rats, forms a nucleus for fly-breeding, always stinks, and is often on fire. Yet it remains the favourite method of disposal.

An ideal system would be for householders to sort their rubbish, as they are supposed to do now, into papers, tins, ashes and organic matter, and for the last to be placed in small tightly-lidded tins which could be collected and removed without being opened, the full tins being replaced by empties at the time of removal. This would cost something in tins and suitable vehicles for their carriage, but all the refuse would be profitable and the net result to the householders would be not only the suppression of a cause of ill health but relief from a costly item on their rates.

Annotations

SALICYLATES AND HÆMORRHAGE

MANY years ago Binz noted that the large doses of salicylates given for the treatment of acute rheumatism sometimes caused hæmorrhages from mucous membranes. In 1926 Wetzel and Nourse[1] remarked that mucous membrane hæmorrhages were common in methyl salicylate poisoning. The liability of acetylsalicylic acid to produce gastric hæmorrhage[2] has been ascribed to the local irritant action of insufficiently disintegrated particles on the areas of gastric mucosa where they lodge. Honigsberger,[3] however, favours a general action; he has reported 3 cases of epistaxis after taking aspirin, and suggests that inquiries about aspirin treatment should be made in all cases of obscure bleeding. An explanation of the way salicylates produce hæmorrhage has now been put forward by K. P. Link and his colleagues as a result of their study of the action of 'Dicumarol.' Dicumarol does not affect the clotting of blood or plasma in vitro; given by mouth it induces a hypoprothrombinæmia after 24 hours or so and this latent period cannot be shortened by intravenous injection. The reasons for the delay are intriguing—dicumarol may inhibit prothrombin formation in the liver and time will then be needed for the prothrombin level in the blood to fall; dicumarol may qualitatively alter prothrombin; or dicumarol itself may undergo chemical changes. Huebner and Link[4] have now demonstrated that dicumarol can be qualitatively degraded to salicylic acid, and their study of substances structurally related to dicumarol has shown that the only ones having anticoagulant action are those that theoretically may yield salicylic acid or an *o*-hydroxybenzoic acid on degradation. The next step was to test the action of salicylic acid itself. Link and co-workers[5] found that when single doses of salicylic acid are given to rats kept on an artificial diet low in vitamin K, lowering of the prothrombin level in the blood follows; if vitamin K is present the hypoprothrombinæmia does not develop; if the salicylic acid is given over a long time hæmorrhages occur. Salicylic acid, like dicumarol, does not act in vitro. These observations on the hypoprothrombinæmic action of salicylic acid have been reproduced in man by Shapiro et al.[6] and Meyer and Howard[7]; they found that, as in the rat, simultaneous administration of vitamin K or a corresponding naphthaquinone will prevent the fall of prothrombin, although it is well known that vitamin K has little influence on dicumarol-produced hæmorrhages. An interesting point was that acetylsalicylic acid was found to be more effective than salicylic acid. There is thus good evidence that salicylic acid reduces the prothrombin in the blood, and this would satisfactorily [illegible] it have [illegible] local [illegible] pretty [illegible] thrombin content of the blood should be estimated in cases of *suspected salicylate hæmorrhage. Link's technique of* estimating the prothrombin in 12·5% plasma should be followed, since in his extensive experience this technique showed the earliest changes best. There seem to be good grounds for giving vitamin K (6 mg. of 2-methyl- [illegible] prophy- [illegible] doses of salicylates. By analogy with the treatment of dicumarol hæmorrhage, the treatment of salicylate hæmorrhage should be transfusion of fresh blood; vitamin K is not likely to be effective. Here again we have a long-known clinical fact waiting many years for experiment to bring an explanation.

ANOTHER YEAR'S SURVEY

THAT there is "no simple way of measuring the health (in a positive sense) of 40,000,000 people" makes it difficult, as the Minister of Health points out in his summary report[8] for 1942–43, to assess the effects of war on the fitness of the nation. It is true that in some respects we seem to be healthier than in peace-time; 1942, in fact was a year of record-breaking in vital statistics: maternal and infant mortality rates, the proportion of stillbirths and the standardised civilian

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[1] [illegible]
[2] [illegible]
[3] [illegible]
[4] [illegible]
[5] [illegible]

[6] Shapiro, S., Redish, M. H., Campbell, H. A. *Proc. Soc. exp. Biol.* 1943, 53, 251.
[7] Meyer, O. O. and Howard, B. *Ibid*, p. 234.
[8] Report for the year 31.iii.43. HMSO, 1s.

PATHOGENESIS OF JAUNDICE

A LONG step forward in the study of a pathological process is taken when the microscope demonstrates its successive stages and the various ways in which it may evolve. Such histological studies are seldom possible in the case of a rarely fatal process affecting an internal organ. Acute hepatitis is a case in point, but IVERSEN and ROHOLM showed that liver biopsy is a practicable[1] and informative[2] procedure. Their technique has been used, and their observations extended by DIBLE, MCMICHAEL and SHERLOCK who report a first instalment of their own findings on an earlier page. It should be noted in passing that they do not recommend liver puncture as a routine procedure; it is not without risk of internal bleeding, especially in jaundiced patients. The basic findings were degeneration of liver cells coupled with infiltration of leucocytes and histiocytes. Cellular necrosis and autolysis was most marked in the centres of the lobules and seemed to spread outwards, whereas the infiltration was greatest in the portal tracts and spread inwards. In a mild case during the first week of jaundice, and generally in favourable cases, the periportal infiltration predominated, giving a "zonal" type of change. Severe cases presented early a "diffuse" type of change, with more pronounced cell necrosis and more widespread infiltration. There was no reason to regard these differences as fundamental, since an intermediate "mixed" type of lesion was also found. Four possible end-results of hepatitis are described. Recovery with complete restitution may follow even very severe lesions, for regeneration is assisted by the preservation of the reticulin framework of the liver in the diffuse type of change. The lesion may progress to a fatal issue with acute or subacute hepatic necrosis. When the disease is prolonged, fibrotic changes may give rise to a classical cirrhosis. Or a mild residual fibrosis may persist for some time after the zonal type of lesion, probably clearing up completely later.

Several points of interest arise from the biopsy findings. There was no evidence of bile stasis in the interlobular ducts, and it must be accepted that the pathological basis of epidemic jaundice is hepatitis and not biliary obstruction due to a plug of mucus in the papilla of Vater or an ascending cholangitis. This conclusion is also supported by the demonstration that liver inflammation has begun at the time of prodromal symptoms hitherto regarded as gastro-intestinal in origin. No histological differences were observed between cases of epidemic jaundice and those in which jaundice followed arsenotherapy or injections of human serum or plasma. This apparent histological identity does not, the authors state, imply that the same ætiological factor is concerned. The biopsy material illustrates how acute hepatitis may progress to acute or subacute liver atrophy or to cirrhosis, and that periportal "cirrhosis-like" infiltrations constitute one form of acute hepatitis.

These fundamental studies will interest especially those who are engaged in investigating hepatitis at the present time. CAMERON has reported[3] on work [illegible] by himself and others in Palestine. Clinical [illegible] in cases of hepatitis among British troops were similar to those described in epidemic hepatitis elsewhere, as were the pathological findings in one biopsy and four fatal cases. In many of their cases the incubation period was prolonged and the onset was precipitated by a secondary factor, such as alcohol, intercurrent illness, chill, low diet or the fatigue of active service. Unsuccessful attempts were made to transmit infection by inoculating whole blood or leucocytes into monkey, dog, guineapig, mouse, rat or hamster. Suggestive results were obtained in human volunteers inoculated with one or two c.cm. of blood from cases of infective hepatitis. One volunteer developed a typical attack of hepatitis 30 days after inoculation, and five of the other six volunteers are known to have developed jaundice within 6 months. During this period there were other cases of hepatitis in the unit to which the volunteers were posted, so that, as the authors admit, the experiment was not conclusive. VOEGT[4] however claimed to have produced jaundice in human volunteers with injections of serum from cases of infective hepatitis, and CAMERON'S experiments strengthen the supposition that there is an icterogenic agent in the blood of early cases. VOEGT also had some success with duodenal juice which was drunk by volunteers, and FINDLAY and MARTIN[5] have induced jaundice in human volunteers by intranasal instillation of nasopharyngeal washings from men who had hepatitis after inoculation against yellow fever.

Evidence is thus accumulating that icterogenic agents are present in blood, nasopharyngeal washings and duodenal juice of cases of hepatitis. Only after their successful isolation will it be possible to fix the responsibility on particular agents for the hepatitis of epidemic, arsenotherapy and serum jaundice. In the meantime clinical, biochemical and epidemiological investigations may yield information that will aid diagnosis, treatment and control of the condition.

DISPOSAL OF REFUSE

THE evacuation of Watford Isolation Hospital necessitated by flies alleged to come from a nearby corporation dump may lead to litigation, but the hospital belongs to a joint board on which the town council is well represented, and the dump is the property of the corporation, so there seems no sense in loading the citizens with legal expenses. The law on the subject is clear—a corporate body has no more right than a private citizen to create a nuisance—so if the alleged offence is proved the board can obtain an injunction against the corporation. But if the corporation is compelled to abandon the dump it must find another way of dealing with its refuse. It may astonish the modern generation that the hospital was built next to the dump, or vice versa; but it was a common practice in the early days of fever hospitals to put them in out of the way corners away from respectable property, and pest-houses and pestiferous dumps were considered appropriate neighbours.

Household refuse collection and disposal in this country has never satisfied public health requirements, for tipping and incineration, the only common forms of disposal, are both objectionable. Paris and some other cities had methods of disposal which are profitable and harmless, but until the war we paid little attention to possible profit from refuse.

[illegible]sen, P. and Roholm, K. *Acta med. scand.* 1939, 102, 1.

Roholm, K. and Iversen, P. *Acta path. microbiol. scand.* 1939, 16, 427.

Cameron, J. D. S. *Quart. J. Med.* 1943, 12, 139.

[4] Voegt, H. *Münch. med Wsch.* 1942, 89, 76.

[5] Findlay, G. M. and Martin, N. H. *Lancet*, 1943, i, 678.

and cheap and nasty methods were the rule. The war has shown how domestic rubbish can be collected and disposed of profitably without offence, and if war-time methods can be continued and extended in peace the problem will be solved. The dangers of refuse arise mainly from the decay of organic matter; if this can be separated from the rest and got rid of expeditiously, health will be satisfied. During the war there is comparatively little kitchen waste and that is used for feeding pigs and poultry. It is doubtful whether the conversion of offal into human food will continue after the war, and moreover we shall have a return of orange peel, banana skins and the like, of no value for animal feeding. Yet if organic waste is kept separate and dry it can be used as fuel and still be an asset. Health officers have tried hard and long to get people to burn their animal and vegetable refuse in their own grates, but with little success, and we must expect even less success in future if grates and stoves which burn raw fuel are superseded by gas and electric fires. In the country, householders can use their organic refuse as compost for their gardens, but this is impracticable in towns. Townspeople might agree to reserve one small bin for their putrefiable waste if such bins were part of the standard equipment of all houses. Collection would be neither difficult nor unpleasant and the material could be burnt in utility plants. The system of a specially designed sink, which was installed in some flats in Leeds, works well and is perhaps the best way of getting rid of refuse from flats in cities, but to be successful it must be used with intelligence. Outside large towns, tipping will no doubt continue for many years whatever is said against it; if trench tipping is adopted it can be made largely inoffensive, but this calls for much land and labour which small sanitary authorities are reluctant to supply. The dump is unsightly, harbours rats, forms a nucleus for fly-breeding, always stinks, and is often on fire. Yet it remains the favourite method of disposal.

An ideal system would be for householders to sort their rubbish, as they are supposed to do now, into papers, tins, ashes and organic matter, and for the last to be placed in small tightly-lidded tins which could be collected and removed without being opened, the full tins being replaced by empties at the time of removal. This would cost something in tins and suitable vehicles for their carriage, but all the refuse would be profitable and the net result to the householders would be not only the suppression of a cause of ill health but relief from a costly item on their rates.

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THAT there is "no simple way of measuring the health (in a positive sense) of 40,000,000 people" makes it difficult, as the Minister of Health points out in his summary report[8] for 1942–43, to assess the effects of war on the fitness of the nation. It is true that in some respects we seem to be healthier than in peace-time; 1942, in fact was a year of record-breaking in vital statistics: maternal and infant mortality rates, the proportion of stillbirths and the standardised civilian death-rates were all the lowest ever recorded in England and Wales, and the incidence of infectious diseases was also unusually low. Apart from tuberculosis and venereal disease, which remain black spots, there is no evidence of any increase in long-term illness, and surveys showed no deterioration in the nutritional state of the population. Comparison, of course, has to be made with statistics from the prewar years, and not with any ideal standard of what the health of the public might or should be. Moreover, the statistics available take no account of minor ailments, or sensations of fatigue and strain which nibble at the sense of well-being without bringing down the whole structure. Sample inquiries among doctors and rising claims for health benefit under NHI suggest an increase in short-term sickness such as might be expected after three years of war in which people have had to contend with long hours of work, with shopping, travelling and housing difficulties, civil defence and Home Guard duties, lack of holidays and the blackout. On the whole, Mr. Brown is able to assure us, at the end of 1942 the general health of the nation had been well maintained.

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[1] Wetzel, M. C., Nourse, J. D. *Arch. Path. & Lab. Med.* 1926, 1, 182.
[2] [illegible] 13, p. 49.
[3] [illegible] 10, 1943, p. 57.
[4] [illegible] *biol. Chem.* 1941, 138, 529.
[5] [illegible]
[6] Shapiro, S., Redish, M. H., Campbell, H. A. *Proc. Soc. exp. Biol.* 1943, 53, 251.
[7] Meyer, O. O. and Howard, B. *Ibid*, p. 234.
[8] Report for the year 31.iii.43. HMSO, 1s.

CARCINOMA OF THE PROSTATE

The treatment of prostatic cancer has become a live subject for discussion since Huggins[1] reported from Chicago last year that castration affords remarkable relief even in the advanced stages. E. W. Riches of the Middlesex Hospital, in a discussion published in the *British Journal of Radiology* for July, says that the most successful form of treatment before the introduction of castration and stilbœstrol for this purpose was resection followed by radiotherapy; his experiences with radium have on the whole been unsatisfactory. Alexander Haddow, of the Chester Beatty Research Institute, urged caution before concluding that the new methods are really efficient, but the results reported by the clinicians seem extremely encouraging. Both castration and the use of stilbœstrol have emerged from the experimental stage and must now be considered the best treatment available. Even when there is not much change in the size or state of the prostate, pain from either the primary focus or the metastases is almost invariably relieved. The change in the patient's general condition—a rise in weight and improvement in vigour and feeling of well-being—is equally gratifying. The results are the same whether the patient has been treated by castration, œstrogens or both combined, and no ill effects have yet been reported.

NEW LIGHT ON BRONCHIAL ANATOMY

The average anatomical textbook submits the trachea and main bronchi to precise scrutiny, but once the tubes and associated blood-vessels have entered the substance of the lung leaves their arrangement and destination in veiled obscurity. Pathological terms relating to lung disease—central or hilar pneumonia, upper or mid-zone infiltration—are no less vague. Physicians and surgeons engaged in chest work cannot afford to go on being hazy about the detailed anatomy of the bronchial tree, and our working knowledge of it, which owes much to the observations of Félix, Twining, Scott Pinchin and Morlock, and Nelson, has recently been amplified by Foster-Carter[2] and Brock.[3] A great deal of inaccuracy has probably resulted from reluctance to use lateral X-ray films in diagnosis. Owing to the obliquity of the main interlobar fissure it is impossible to say from an anteroposterior film whether a "mid-zone" lesion lies in the upper, lower or even middle lobe. Lung abscesses, limited areas of pneumonitis, growths, foreign bodies and collections of fluid or pus can only be exactly located by means of radiograms in two planes. These show that most of the localised pulmonary lesions occupy a segment of lung supplied by a more or less constant sublobar bronchus. The anatomy of these branches and the areas which they serve have now been studied by means of casts, gelatin injections, dissection, and radiographic analysis. Brock has confirmed that the main bronchus of the right upper lobe divides into apical, pectoral and posterolateral branches. Most accounts mention an important axillary tributary, but the area which this is supposed to supply is actually served by two components—an axillary branch from the pectoral and one from the posterolateral or subapical. A main axillary branch is seldom present. The subapical segment lies deep to the scapula and for this reason is clinically silent; it may not show up well in lateral radiograms, yet it is often the seat of disease. Tradition has also placed the posterior and upper limit of the interlobar tissues too high. The apex of the lower lobe rarely reaches higher than the 5th or 6th rib and the line of the fissure is placed lower and more horizontally than is generally depicted or described. The apex of the lower lobe (a common site for lung abscess and tuberculous cavitation) is supplied by the large first dorsal branch of the lower lobe; and the direction of this bronchus is directly backwards off the main stem. With the patient lying on his back secretions drain readily into it, which may explain why the area it supplies is often in trouble. That the position of the patient has an effect on the site of embolic infections has been recognised, and experimental evidence of it is advanced by Brock and others.[4] Posture and gravity share in both the ætiology and treatment of pulmonary infections, but they cannot be used effectively in therapy without full knowledge of the bronchial anatomy.

THE HEART AND THE GUT

When heart disease simulates gastro-intestinal disease, or vice versa, the patient nearly always gets hold of the wrong end of the stick, and his doctor, unless he is wary, may find himself misled—possibly with fatal results. Of cardiac conditions masquerading under the guise of indigestion one of the commonest and most important is coronary disease either in the form of thrombosis, or of angina pectoris. In the case of angina pectoris it is when the pain is atypical in situation, occurring for instance elsewhere than substernally even being lower substernal in site, that most difficulty arises, especially when the pain occurs. A full and reliable history, especially of the relationship of the pain to exertion and rest, is the key to the diagnosis. Exercise immediately after a meal is much more liable to induce an attack than the same amount of exercise 1–2 hours later. The effect of nitrites is a helpful therapeutic test, particularly when negative; if amyl nitrite or tabellæ trinitrini do not relieve it, the pain is not that of angina pectoris. The pain of coronary thrombosis is more liable to radiate, even into the abdomen, and may be associated with nausea or even vomiting. Here again the history is important; hypertension may be a pointer, and serial electrocardiograms often settle the diagnosis.

Coronary thrombosis may confuse the picture in a patient who already has some abdominal lesion such as a peptic ulcer or carcinoma of the stomach. Congestive heart-failure, whether acute or chronic, seldom gives rise to difficulty, even when hepatic enlargement and tenderness or jaundice predominate: there are always some manifestations of heart-failure elsewhere, such as dyspnœa, congested cervical veins, or crepitations at the bases of the lungs. The symptoms of embolism, particularly when renal, splenic, or mesenteric, may be puzzling but are usually explained if careful search is made for the origin of the embolus. Hurxthal[5] suggests that all patients with mitral stenosis and auricular fibrillation should be advised, in the event of the onset of sudden severe abdominal pain, to remind or inform the doctor called in to them that they do suffer from this condition. A rare cause of difficulty in diagnosis is dissecting aneurysm of the abdominal aorta with pain usually radiating into the lower extremities. Aneurysm of the thoracic aorta and mitral stenosis occasionally cause dysphagia by pressure on the œsophagus, and so may dextra-aorta. Finally digitalis may cause nausea and vomiting, and some patients cannot tolerate even relatively small doses.

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[1] Huggins, C. *Ann. Surg.* 1942, 115, 192. See *Lancet*, 1943, i, 177.

[2] Foster-Carter, A. *Brit. J. Tuberc.* 1942, 36, 19. *Proc. roy. Soc. Med.* 1943, 36, 451.

Brock, R. C. *Guy's Hosp. Rep.* 1943, 91, 111.

[4] *Ibid*, p. 131.

[5] Hurxthal, L. M. *New Engl. J. Med.* 1943, 229, 148.

The picture is less complex when gastro-intestinal disease simulates cardiac disease. The Americans have emphasised that a case of diaphragmatic hernia may resemble heart disease, especially as regards the type of substernal pain. Such a hernia is easily missed except by careful radiological examination. In acute dilatation of the stomach the striking signs may be tachycardia, dyspnœa and cyanosis: Hurxthal's advice is not to forget the stomach-tube. [illegible] toris may be due to anæmia [illegible] carcinoma of the colon, an [illegible] tools for occult blood is often the first pointer to the correct diagnosis. The association of gall-bladder disease and coronary disease is as classical as it is controversial, and it is only by reviewing all the evidence impartially that the doctor can avoid mistakes and protect his patients with coronary thrombosis from major abdominal operations.

CHEMOPROPHYLAXIS IN SCARLET FEVER

ROUTINE administration of sulphonamides in scarlet fever has not yielded clear-cut results, the drug seeming to exercise constant specific effect only in severe cases or in the presence of certain complications. Possibly this fact, and the mild character of the disease, have discouraged large-scale investigation of sulphonamides in the prevention of scarlet fever. The staff of a United States Naval Station[1] now report such an experiment undertaken on personnel numbering several thousands. These consisted of radio students in residence for 4 months and transients who stayed for periods of a few hours to several weeks, both groups being closely intermingled in dormitories and mess rooms. At a time when about 10 cases of scarlet fever (due to a group A, type 19 organism) were appearing weekly in both groups of men, the entire student population was given 0·5 g. of sulphadiazine twice daily, the transient group being untreated. A sharp decrease in scarlet fever incidence followed immediately among the students. The transient group was then stabilised as far as possible, and given 1 g. of sulphadiazine daily in a single dose. An even more striking decrease in incidence followed in this group. The drug was discontinued in both groups on Dec. 22, but no new cases of scarlet fever had appeared by Jan. 8. This was unexpected, particularly as a continuous survey showed a high and persistent type-19 carrier rate. Watson and his colleagues attribute the absence of scarlet fever at this time to dilution of carriers and susceptibles by intervening leave periods, but do not say whether the disease reappeared later. During the period of sulphadiazine prophylaxis a definite decrease in general respiratory illnesses was noted in both groups of men—a not unexpected result, in view of the hæmolytic streptococcal origin of many such illnesses. Reviewing the whole epidemic—the difficulties of maintaining adequate control in a shifting population, the absence of scarlet fever for at least 16 days after the drug was discontinued and the known vagaries of scarlet fever in epidemic form—it is difficult to feel certain that the outbreak was brought to an end by sulphadiazine. But the results fully justify further trial in circumstances favouring the rapid spread of a single-type infection in closed or semiclosed communities. That this may be done without risk when sulphadiazine is employed is evident from the trivial incidence of toxic reactions in this study. Gastro-intestinal disturbance, that bugbear of ambulant sulphonamide therapy, was not encountered.

PAIN IN THE RECTUM

Ryle[1] has recently described the distinctive qualities of the pain produced by different types of anal and rectal disease, and has analysed the parts played by mucosal inflammation and ulceration on the one hand, and by muscular spasm and distension on the other. He shows that rectal carcinoma, which may be regarded as the most serious of the rectal lesions, is often painless; whereas nervous proctalgia, seemingly due to tonic contraction of the strong muscular coat of the rectum, may be associated with agonising pain, without evidence of a local lesion. Normal and painful sensations in the rectum are probably always expressions of rectal muscle sense, whether of distension or of muscle spasm. The mucosa is insensitive. The anal mucosa, on the other hand, is extremely sensitive near the anocutaneous margin, and decreasingly so as it approaches its junction with the rectum. Ulceration of the rectal mucosa may therefore be quite painless, while an anal fissure, particularly during the act of defæcation, gives rise to exquisite pain, often referred to parts as distant as the thighs and buttocks. Ryle draws attention to the errors in diagnosis that arise from want of recognition of the widely referred pain in anal disease. The ulcer or fissure is tender to direct pressure, and can be fairly accurately localised by the patient. He does not mention that paralysis of the anal sphincter, whether by injection of a drug of the novocain type, or by stretching of the orifice under anæsthesia, can completely relieve the pain; thus anal spasm is obviously an important factor. Peri-anal hæmatoma (from thrombosis of an external pile) and peri-anal abscess cause a throbbing pain, aggravated by straining or coughing. The stripping up of the sensitive anocutaneous margin probably produces the pain. Ball-valve accumulations of hard fæces in the rectum cause a peculiar type of pain that has been specially studied by Ryle. The pain is of a bearing-down nature, and is rhythmically recurrent. The mass of fæces causes a partial obstruction that allows the passage of small ineffectual fluid motions, possibly mixed with blood. Bladder irritation may be present. Blood or barium make a stool of such consistence that it moulds into scybala which cannot easily be evacuated; a history of recent gastric hæmorrhage or of barium meal examination is suggestive. Rectal examination will confirm the diagnosis. In obstructive lesions of the rectum—for example, in growths at the pelvi-rectal junction—the pain is likely to be felt higher in the colon, owing to distension and the efforts of the muscle wall of the colon to overcome the obstruction. When pain is present in carcinoma of the rectum it probably indicates spread of the disease beyond the rectum. Ulceration invading the anal canal causes pain on defæcation. The rectal sensation is likely to be a sense of fullness and an urgency to empty the rectum, rather than one of pain. The most severe type of pain felt in the rectum is that described by Ryle as nervous proctalgia. He thinks it probable that the muscle-fibres involved in the spasm are those of the lower part of rectum and of the internal sphincter. If the recto-coccygeal muscle is affected there may be a feeling as if the coccyx is being bent forwards or backwards. The spasms of pain occur chiefly at night and last from 5 to 20 minutes. During the attack there may be an attempt at intussusception of the rectum. Injection of air or water through a Higginson's syringe may cut short the attack, presumably by distending the spasmodic muscle. The ætiology of this type of spasmodic contraction is obscure, but Ryle has found that it is often associated with fatigue, overwork and anxiety. The pain may be agonising.

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[1] Watson, R. F., Schwentker, F. F., Fetherston, J. E. and Rothbard, S. *J. Amer. med. Ass.* 1943, 122, 730.

[1] Ryle, J. A. *Guy's Hosp. Rep.* 1943, 91, 117.

Special Articles

BRITISH MEDICAL ASSOCIATION

FUTURE OF MEDICAL SERVICES

THE Representative Body met in London last week and debated the bases of medical reform. Dr. PETER MACDONALD presided.

Mr. H. S. SOUTTAR (chairman of council) said that the profession faces a crisis. The end of the war would also be the end of an epoch. The postwar future of medicine held vast possibilities, but their fruition demanded wisdom, patience, and not a little self-sacrifice. We must not grudge the effort nor allow the personal interests of the moment to blind our vision. The BMA had been active and the report of its Medical Planning Commission had preceded the Beveridge report. Indeed some of the Beveridge proposals were taken from the Commission's report. But when the Government set out to give effect to these proposals they assumed a very different complexion. "Our axiom that a first-class medical service should be obtainable by every individual, whatever his economic status, is expanded into the proposition that no-one is to pay for our services. Our desire to work together in groups is converted into regimented service under a local authority." Nevertheless the profession could not adopt a purely negative attitude; unless its policy was constructive it would fail. Accordingly the meeting was invited to consider certain general principles, and in so doing could lay the foundations of future medical practice in this country.

Points of View

Dr. J. D. R. MURRAY, for Exeter, asked the Representative Body to "view with grave apprehension the institution of a comprehensive health service provided as a right for the whole community. . . ." The Minister of Health's desire to secure a family doctor for the millions who have not got one could be met by extension of NHI to dependants. The remaining 10% of the community should not be included, for they clearly had no wish to belong to a glorified panel service. To which Dr. W. W. FOX replied that evidently NHI was considered good enough for the workers but not for the other 10%. Was it the duty of the profession to make distinctions or to provide the best service for all?

Dr. RAYMOND GREENE pointed out that a plan will be produced by somebody. If wise, doctors would bring forward a plan of their own, putting service to the nation first but also remembering that the best service can be given only by a profession which is able to work happily.

Dr. F. GRAY thought the decision whether everyone should be included in a national service should be left to Parliament. To object in advance might make the public—whose good will was needed—think that doctors have selfish financial reasons for wanting to exclude the best-off section of the community.

Dr. J. A. MOODY, for Stratford, advised postponement of discussion till the white-paper appears. The Government's proposals might appeal to a large section of the profession, and by tying itself in advance the BMA risked a repetition of 1911. But Mr. SOUTTAR urged that the strategy of war is to hold the initiative: instead of waiting for the Minister's terms the profession should state its own opinion and let the country follow its lead.

Dr. R. H. BALFOUR BARROW, for Winchester, wished the meeting to "oppose any fundamental change in the medical profession during the absence of so many members in the Services." Mr. SOUTTAR, however, believed that inactivity is not enough. "Do we want them to come back and find we've done nothing? No. We want them to come back and find a service so good as to be barely recognisable." Dr. GREENE thought there was something rather sinister about the way in which the men now serving are used as propaganda for a delaying action which might lead to plans being forced on the profession from outside. He had questioned many of the generation that have no practices to come back to, and found that at least 90% hope that the doctors left behind are going to prepare a decent profession for them to work in. Dr. BARROW said his lution was suggested by Service members; but he not carry it.

SALARIED STATE MEDICAL SERVICE

After these preliminary skirmishes Dr. J. B. JESSIMAN, for Worcester, proposed a motion condemning a whole-time salaried medical service. Attacking the Minister of Health, he described the project as a political expedient divorced from humanitarian principle.

Dr. W. V. HOWELLS claimed that radical change is needed in the present system; whose evils were evident in competition for patients, sale of practices, lack of time for diagnosis, and failure to take postgraduate courses, attend meetings or open journals. At last doctors were becoming vocal about these evils, and about their inability as "sickness experts" to affect the causes of ill health. The BMA should throw its weight into the struggle against disease. For this a comprehensive service was essential. It need not necessarily be a state service; but it must have a measure of coördinating direction, and this meant that it must be a salaried service.

Dr. G. H. STEELE argued that practitioners in a state service would not necessarily have more time for their work; and those who managed to get up against the Minister might be left with no means of earning a living. Dr. W. D. ANDERSON thought that after a period of evolution a full-time salaried state service might be the best this country could have; but its amenities, such as an 8-hour day, holidays, and postgraduate study, could not be realised while there was deficiency of personnel. Dr. C. M. STEVENSON said that the question at issue was not what is easier for the profession but what is best for the public. From that standpoint he believed the service should be comprehensive but neither salaried nor full-time.

The following resolution by Mr. J. ALLISON CORKEY, for Belfast, was passed by 200 votes to 10:—

That in the opinion of the Representative Body the creating of a whole-time salaried state medical service is not in the best interests of the community.

WHY THE HURRY?

As a reason for delay several speakers referred to the shortage of man-power. Sir KAYE LE FLEMING said that the service envisaged could be carried out only with a full complement of doctors. Even after the war many doctors would be retained in the Army for many years. To offer a comprehensive medical service in the near future when there was no possibility of providing it was a political gesture comparable to Jesse Collings's offer of 3 acres and a cow to every elector. The profession should make it clear to the public that it is ready and anxious to adopt reform on the lines of the Beveridge report, but that this is a long-term policy and there is no need for us to be hurried down the road. Everyone knew that the war has seen a great increase in pulmonary tuberculosis and that accommodation for the tuberculous is absolutely insufficient. What was the answer of the Ministry of Health? Preventive medicine and mass radiography! They were going to add to the crowd standing outside waiting for treatment but were doing nothing to provide the treatment.

Dr. J. A. BROWN said that general practitioners are getting a little tired of being asked to practise preventive medicine when prevention should be achieved by other means. They were asked to prevent tuberculosis while the sale of tuberculous milk is permitted; to encourage cleanliness when houses have no baths.

Dr. J. M. CAMPBELL declared that the profession resents being made the first object of reform—the Beveridge guineapig.

FUNCTIONS OF THE STATE

The City of London division tried to make the meeting say that the function of the state should be to provide a medical service which will give to its citizens the full benefits of modern medical progress. "Such a service," they declared, "will require a radical measure of reconstruction."

Dr. C. K. CULLEN maintained that no mere coordination of existing services, augmented where necessary, will give us the comprehensive service to which the Government is pledged. The Representative Body had allowed itself to be frightened by bogies—especially the bogy of change. All wanted freedom, but what sort of freedom? Freedom to do their work properly, freedom from isolation and the segregation of general practitioners from specialists, freedom from the anxieties of insufficient equipment, freedom from the nightmare of avoidable mistakes, freedom from the cramping restrictions under which work is done at present. These freedoms were not dreams but could be got in a measurable time if the profession is determined to have them. "Why talk about planning if we are to wait for evolution to work out the solution for us?" Dr. P. INWALD claimed that medical services should be as universally available as water-supplies. Like modern industry, modern medicine required planning.

Dr. J. B. MILLER, for the council, held that "radical measures of reconstruction" are opposed entirely to the BMA policy, which is one of evolution. The City resolution was lost by a large majority.

CONTROL OF DOCTORS

Dr. H. G. DAIN, for the council, said that the first idea of the Ministry of Health had been that young men coming into the new service must be whole-time and under the control of the service. Control of the profession was considered necessary because of the large sums that will be involved in certification. Doctors were willing to serve the public in the interests of patients. "But we can do this perfectly well as we do today without control by any other body. The fact that the state organises and pays for certain services for certain members of the community does not mean that the state should exercise any control over the doctors who do the work."

Dr. INWALD pointed out that—as regards notification of infectious disease, for example—the state already controls doctors rendering personal service. Dr. CULLEN said that as a tuberculosis officer working for a local authority he had never experienced any interference in the patient-doctor relationship. If there was to be control, let it not come from a remote office: he hoped for an extension of democracy in which control was exercised by people who came in contact with the doctor and would support him when attacked. When doctors as a body came under control they would have far more influence than as individuals.

Dr. R. W. COCKSHUT said the time had come when the small minority represented by the two previous speakers should cease their continuous attempt to change the views of the profession. They would never change them. They should give up trying and form a united front. Dr. INWALD replied that the Representative Body does not fully represent the substantial size of the minority in the profession.

Dr. O. C. CARTER and Mr. DONALD WATSON believed that whenever a Government assumes responsibility for a service it must exercise some form of control. Another speaker thought it would suffice to insist that there is no control of professional work for patients. But Dr. DAIN, who was amused at the idea that medical practice is today conducted in a state of anarchy, opposed control in any form. He objected to control of professional work; "but I want you," he said, "to be equally opposed to control of your personal freedom to practise where you like and how you like."

Dr. R. H. MOLE, for Oxford, wanted state control of doctors rendering individual or personal services to be limited "to ensuring the maintenance of a reasonable professional standard and a maximum of personal and professional responsibility." Control in some form was essential; it was useless to keep one's head in the clouds and pretend to be living in a world where there are no statutory limitations at all. What was important was to show the public that the doctor is and must remain primarily a free agent who has to act on his view of what is best at any particular moment.

Dr. P. PHILLIPS said that the legal responsibility always lies with the doctor. The attitude of his own municipal authority was: "We employ fully qualified medical men and if anything goes wrong the responsibility is theirs." He felt that control of any future medical service should be in the hands of doctors and not of lay civil servants and the like.

An amendment by Reigate opposed the setting up of "any central body, either medical or lay, to control the medical profession"; but Dr. DAIN remarked that such a body already exists in the GMC and that some day doctors might be very glad to have a medical body of this kind.

On one subject the meeting was united—namely, that future medical services shall not be controlled by local authorities as at present constituted.

A NATIONAL HEALTH CORPORATION

Prof. R. M. F. PICKEN, for the council, spoke of the need for "foundation changes" in central and local government agencies administering health services. At the centre half a dozen government departments shared responsibility; yet apparently the medical profession was alone in asking for the cleansing of this augean stable. Proposals for the improvement of local authorities, so far as they are known, were inadequate.

Dr. F. GRAY, for Wandsworth, said that two forms of central authority were possible. The first was a government department staffed by civil servants under a minister responsible to Parliament for every detail of its work. The aim of such a department must always be to avoid questions and make the appearance of things nice. The permanent head, the secretary, was appointed by the Prime Minister on the advice of the Treasury; and as prime ministers are busy men he was in effect appointed by the head of the Treasury. The attitude of the Treasury was negative and critical; it disliked the man who brings new ideas, new schemes, and requests for money. Civil servants hoping for high appointments behaved accordingly.

The alternative to a government department was a corporate body. This might consist of a board with half a dozen members appointed for a fixed term. The board was responsible to Parliament through a minister, but the latter was not answerable for the details of its work.

The profession, said Dr. Gray, wanted a comprehensive, coördinated and unified medical service. There was little chance that the various government departments at present concerned with medicine would surrender their functions to one of their own number, the Ministry of Health; but if a new corporate body were formed this difficulty would be removed. The profession wanted the new health service to be progressive; it must not stand still. But government departments were seldom anxious for new departures; they preferred to let things be. The profession wanted a long-term policy—not one policy one year and another the next. But government departments changed hands; the Post Office had had 11 postmaster-generals in 14 years. The profession did not want the medical services to be the sport of party politics—one party urging economy and another development. A board appointed for a fixed term would remove them from political control. Detailed parliamentary control was founded on distrust of civil servants; but if Parliament desired the best service it must trust the profession and not worry it about details.

Could it be said that the Ministry of Health had been out to secure the best medical service? It had concentrated on one thing only—to get the cheapest service. It had been subservient to the Treasury. Proposals for improvement had met the same reply—No more money. If the public realised this it would not for a moment consider handing over the new service to the Ministry of Health.

Dr. A. T. ROGERS thought it would be unwise to tie the hands of future negotiators by insisting on a corporate body. Its constitution presented serious difficulties and Parliament might not agree. Even with a corporation, Parliament could exercise day-to-day inquisition—as witness questions about BBC broadcasts. Equally satisfactory results might be obtainable from some other type of central authority.

Dr. RAYMOND GREENE said that things are bad, and it was the duty of Parliament to put them right. This could be done by putting them under one control. Should this be the Civil Service? No. The civil servant and the doctor were utterly opposed in training and outlook; where the doctor sought responsibility, the civil servant avoided and divided it. Control by small local authorities was beneath the dignity of a learned profession. The right solution was the setting up of regional councils comprising representatives of local authorities, local interests, and the medical profession.

Over these regions should be a National Board of Health including government nominees, the presidents of the royal colleges, and the chairmen of a dozen consultative committees.

Prof. **Picken**, in reply, deemed it inadvisable to commit the association by declaring for a corporate body. He strongly sympathised with the proposal that public health and medical affairs should be managed by such a body "if it can be obtained." But there were corporations and corporations—in the last century the Poor-law Commission had earned the name of the Three Tyrants—and a corporate body might become unacceptable to the profession. If its institution meant that Parliament could not ask questions it would be bad for doctors as well as the public. A corporate body would not get away from Treasury control, since it must accept Treasury money. He suggested that the meeting should express merely a preference for this solution of the problem.

Dr. **Gray**, on the other hand, urged the meeting to make its choice and then try to convince the country. This solution, and this alone, would give an efficient service. The meeting agreed with him and resolved that "the central administrative structure should be a corporate body . . . responsible for all civilian health services."

PRESERVATION OF PRIVATE PRACTICE

Dr. S. **Wand** said that if 100% of the community were included in the new medical service, private practice would be virtually abolished, and a state salaried service would follow. Supported by Mr. R. L. **Newell**, he proposed :—

That a comprehensive medical service should be available to all who need it, but it is unnecessary for the state to provide it for those who are willing and able to provide it for themselves.

Dr. **Rogers** agreed that it is "unnecessary"—just as it is unnecessary for the state to provide elementary education, water-supplies and sewage disposal. At one time the richer sections of the community provided these things for themselves, but it had now been proved more satisfactory for the state to do so.

Mr. **Donald Watson** said that if 100% were included private practice would become impossible except at the whim of the Minister. Dr. C. F. **Turner** believed that most medical services must serve the entire community : it was only for personal services there should be any question of less than 100% membership. Dr. **Carter**, while agreeing that it would be easier for a Government scheme to comprise everybody, saw no advantage in thrusting it on a section of the public which in his experience definitely does not want it.

Dr. Wand's resolution was carried by 149 votes to 37.

Speaking on the right of patients in the service to consult privately any doctor inside or outside it, Dr. **Dain** said that people entitled to medical care should have the confidence that comes from freedom to use it or not. It would be disastrous if the profession were split into two groups—official and unofficial doctors. Dr. **Gray** remarked that if people cannot get a second opinion inside the service they will go to someone outside, and they might be driven to quacks. Dr. **Cockshut** also spoke of the perils of a black market in medicine.

Mr. A. **Lucas Young** pointed out that if a man paid a private fee to a doctor in the service his poorer neighbours would say : "This man is paying extra for something. For what ? It must be something I'm not getting." He vigorously opposed the idea that people should be allowed to contract out of a 100% service if this was instituted. To permit it would incidentally allow administrators to argue that adequate remuneration of doctors within the service was unnecessary because they could still rely on private work.

Dr. P. A. **McCallum** remarked that the public already divide the profession into panel doctors and other doctors, and Dr. H. H. D. **Sutherland** said that this differentiation must disappear : all sections of the profession should regard themselves as equal.

EXTENSION OF NHI TO DEPENDANTS

In discussing the council's recommendation that, pending other reforms, National Health Insurance should be extended to include dependants and to cover specialist services, the meeting passed, without dissent, the following motion :—

There shall not be any extension of service under the National Health Insurance Acts until satisfactory terms and conditions, including an adequate capitation fee, have been agreed.

"We must show the Government, said Mr. **Lucas Young**, "that we're in flat disagreement with the present system on the present terms."

Derby argued that two-way extension of NHI would place 40 millions in the hands of the friendly societies, and might make it very difficult to get away later from the NHI system. Stratford said that if dependants of insured persons were distributed among panel practitioners before the men on service returned, the absentees would have a poor home-coming.

Dr. **Inwald** feared that extension to dependants might lead to NHI becoming the foundation of a future service. Dr. **Stevenson** said that NHI needs much reform and the proposal to extend it was dangerous : it would be accepted by the public and profession as all that the BMA could offer at present, and reorganisation would be torpedoed. Dr. L. J. **Picton** declared that panel practice, for all these years, has been carried by private practice. If by extending the panel service the profits of private practice were removed, the system would become unworkable. Various representatives felt sure that extension to dependants must mean more work, and Dr. **Howie Wood** said it was physically impossible for doctors in his division to take on any new body of insured persons.

Dr. **Dain**, for the council, explained that there is no intention of starting any new service, or increasing service, while the war lasts.

North Bedfordshire suggested that in extending NHI to dependants the income-limit should be £250. Doctors in some areas would be hard hit if it were £420. Dr. **Dain** replied that though he would like to see the £250 limit re-established it would be a mistake to bind negotiators by naming a figure.

Dr. D. A. R. **Haddon**, for South East Scotland, urged that extension of benefits to dependants should not be undertaken through the agency of approved societies. Dr. T. **Craig** reported a strong feeling in Newcastle-on-Tyne that a time must come for abolishing the control of NHI by approved societies. Dr. **Picton** thought it only fair to say that the societies are not hostile to the profession, and Dr. **Dain** considered it unwise to amend the council's resolution as proposed. Maybe, he said, the approved societies would prove better friends than some supposed.

The council's recommendation for two-way extension of NHI was approved.

HEALTH CENTRES

Dr. **Cockshut** proposed :—

"That experiments in group practice, including health centres, should be carried out by a central authority and not by local authorities."

He need not, he said, emphasise the dangers arising from local authorities experimenting on their own. But Professor **Picken** persuaded the Representative Body to ignore them. Experiment, he said, must be multiform, not uniform.

Dr. R. W. **Rae**, for North Staffordshire, wanted a ruling that "efficient general practice is not dependent on the establishment of health centres." Dr. A. **Beauchamp** said the public would interpret this as obstruction, and the meeting agreed with him.

CERTIFICATION

Dr. H. H. **Goodman** said that either mass unemployment or mass sickness would sabotage the Beveridge plan. As a referee of the Ministry of Labour he had formed an unfavourable impression of the state of medical certification, and on behalf of Newcastle-upon-Tyne he moved :—

That a National Medical Service which preserves the existing relationship of doctors and patients will demand of the doctors a high ethical standard on the matter of certification. One of the main causes of the present laxity is the intolerable increase in the number of certificates of every kind. Under a better organised service these should be much reduced and the profession should, at the same time, be prepared to accept any reasonable supervision of certification, as by the appointment of additional medical referees

Dr DAIN could not agree that there is "laxity" at present The council fully realised the important place that certification will play in negotiations If the profession was to remain free of control it would have to show itself capable of dealing with certification in a manner free from reproach

Dr GOODMAN did not accept suggestions that he should withdraw his motion, and it was lost

MORE AND LARGER MEDICAL SCHOOLS

East Yorks carried a resolution —

That the Representative Body, agreeing with the general principles of the Beveridge plan, strongly recommends that every effort be made to increase the number of qualified medical practitioners and considers that to this end medical schools should be established at provincial university colleges where no facilities at present exist, but where the initial training could be given and ample clinical material is available

Dame LOUISE MCILROY, supporting, said that in London hundreds of would be medical students are turned down for the schools Very difficult for men, admission was almost impossible for women, for only two schools would take them in any number The country needed both new schools and combination of those existing

When the motion was passed a speaker in the body of the hall invited the press to take special note of its first sentence, giving general approval to the Beveridge plan

Principles Adopted

The recommendations of the Representative Committee (*Lancet*, August 14, p 203) were approved by the Representative Body in the following amended form —

(A) (To be embodied in a preamble recalling the principles set out in the *General Medical Service for the Nation*) 1 The system of medical service should be directed to the achievement of positive health and the prevention of disease no less than to the relief of sickness 2 There should be available for every individual the services of a general practitioner or a family doctor of his own choice 3 Consultants and specialists, laboratory services, and all necessary auxiliary services, together with institutional provision when required should be available for the individual patient, normally through the agency of the family doctor 4 The several parts of the complete medical service should be closely coordinated and developed by the application of a planned national health policy acceptable to the profession as a whole

(B) The health of the people depends primarily upon the social and environmental conditions under which they live and work, upon security against fear and want, upon nutritional standards, upon educational facilities, and upon the facilities for exercise and leisure The improvement and extension of measures to satisfy these needs should precede or accompany any future organisation of medical services

(C) The efficiency of a country's medical services, both preventive and curative, depends upon the available medical and scientific knowledge, upon the character and extent of medical education, upon the sufficiency and quality of personnel, upon facilities for treatment and upon the absence of any economic barriers that impede the utilisation of such services Thus in order to improve the country's medical services, the facilities and resources for medical research should be greatly increased and methods devised for their adequate application, medical education, both undergraduate and postgraduate, should be maintained on a high standard and be adapted to modern needs, there should be sufficiency of personnel and institutional accommodation, and wherever economic barriers prevent an individual taking advantage of medical services such barriers should be removed

(D) Subject to these general and overriding considerations the functions of the state should be to coördinate existing provision, both official and non official to augment it where necessary, and to secure that it is available without economic barrier to all who need it The state should confine itself within these wide limits invading the personal freedom of both citizen and doctor only to the extent which the satisfaction of these functions demands

(E) It is not in the public interest that the state should convert the medical profession into a salaried branch of central or local government service The state should not assume control of doctors rendering individual or personal health service The profession rejects any proposal for the control of the future medical service by local authorities as at present constituted

(F) Free choice as between doctor and patient should be preserved as a basic principle of future health services, and no administrative structure should be approved which does not both permit and encourage such free choice

(G) It is not in the public interest that the state should invade the doctor patient relationship The loyalty and obligation of a doctor rendering personal health service to an individual patient should be to that patient and to none other

(H) Free choice of doctor should be reinforced by a method of remuneration which relates remuneration to the amount of work done or the number of persons for whom responsibility is accepted

(I) Every member of the community should be free to consult the doctor of his choice either officially, as when he consults the doctor he has selected under an official service, or privately, as when he consults some other doctor, whether that doctor is a member of an official service or not Nothing should be done to encourage the splitting of the medical profession into two groups—the official doctors and the non official doctors

(J) Consultants and specialists should normally be attached to the hospital For those persons who wish to be treated in private accommodation, whether part of a hospital or not, private consulting practice should continue

(K) The central administrative structure should be a corporate body concerned only with civilian health services and should be responsible for all civilian health services This central administrative body should be advised on medical matters, including personnel, by a medical advisory committee representative of the medical profession which should be at liberty to publish its findings Locally, new administrative bodies, responsible to the central authority, should cover wide areas and should be representative, directly or indirectly, of the community served and, in appropriate proportion of the local medical profession and voluntary hospitals They should be advised on medical matters, including personnel, by local medical advisory committees representative of the local medical profession which should be at liberty to publish their findings These administrative changes should be regarded as foundation changes to be agreed before other changes are initiated

(L) All branches of medical practice should be regarded as a single service, and it is undesirable that a detailed scheme for general practitioners should be framed and put into operation without corresponding arrangements for other branches of practice

(M) Pending the consideration and completion of the foundation administrative changes mentioned in K above, as a step towards the satisfaction of Assumption B there should be extension of National Health Insurance to include dependants of insured persons and others of like economic status and to cover consultant and specialist services and laboratory and hospital facilities as well as general practitioner service The service should be improved from time to time as recommended by the profession Those persons with incomes above an agreed limit could, if Parliament decides to make the service available to every member of the community, be permitted to become voluntary contributors to the extended service A reconstruction of insurance committees would be necessary

(N) There should be initiated by arrangement and agreement between the Government and the profession organised experiments in the methods of practice such as group practice including health centres of different kinds which should extend to general practitioner hospital units attached to general hospitals Future developments in group practice should depend upon the results of such clinical and administrative experimentation

OFFICERS OF THE BRITISH MEDICAL ASSOCIATION

The recent death of Sir Beckwith Whitehouse left the association without a president. On Sept. 21 Lord DAWSON OF PENN was elected to the presidency and at the annual meeting next day he made the speech printed on our opening page.

Dr. H. G. DAIN has been elected chairman of council, and Dr. PETER MACDONALD and Dr. J. B. MILLER have been re-elected chairman and vice-chairman of the Representative Body.

In England Now

A Running Commentary by Peripatetic Correspondents

AN airgraph provides a salutary lesson in self-discipline —it is an ingenious device for eliminating verbosity— so you won't be getting more than a brief paragraph about my doings with the CMF.

In my wanderings through North Africa and now in Sicily I am constantly coming across RMOs who were once in my class at the university. They usually hail me with something like this: "You probably won't remember me, Sir; you lectured to me in pharmacology in 1936. I still remember your questions in the oral examination. . . . Even now I don't know why Stockholm tar is called Stockholm tar . . ."; or, "Oh yes, sir, you plucked me in my materia in '37." This makes an unfortunate opening gambit when one is trying to lead up to some kind of congratulatory expression, having observed the MC ribbon out of the corner of one's eye. Still these youthful RMOs, rapidly maturing to self-confident and even staid practitioners under the influence of war-time experience, bear no rancour. They are obviously a little tickled by the sight of their former teacher clad in "shorts, khaki drill" and "shirt, bush" and welcome the opportunity to recall their experiences as students. Nicknames fall easily from their lips: Old Stockie, Bobby M, Sam C. and Noah are still vivid memories among medicos of the 1st Army and the Eighth.

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If a group of hens are kept together they will soon establish an order of social precedence, what is called a peck-order. Any hen in the group will be entitled to peck any hen in a lower rank of the order without retaliation, but must herself suffer pecks from her social superiors. The order is established by such qualities as strength, aggressiveness, or bluff. Similar orders of dominance are seen in fish and lizards, as well as in mammals such as rats, cats, cows and men. The favoured individuals can secure a larger share of the available food, and, in the case of cock-birds, a larger share of or exclusive rights of access to the females. There is here a struggle in which the "fittest" have both the best chance of personal survival and of procreation. If, however, three separate groups of hens are compared, in two of which the group is allowed to establish its own order, while in the third the order is continually upset by changing round the individuals who compose it, it is found that the organised groups will eat more, keep up their weight better and spend less energy fighting among themselves. Here then we are dealing with advantages affecting future generations controlled by group qualities of organisation and cooperation in which individual differences do not affect the issue.

This experiment was performed by W. C. Allee and his colleagues of Chicago, and Allee has summarised the evidence for the existence of cooperative tendencies in many generations of animals (*Science*, June 11, 1943, p. 517). These tendencies would, he thinks, be favoured by natural selection and become biologically fixed. The usual view of the biologist, particularly of a past generation, is that the operation of natural selection can usefully be considered in terms of individuals and aggregates of individuals alone, without taking into account purely group qualities. The mathematics involved by this view have been worked out in great detail and have provided one of the major advances in biological thought in our time. But, with the exception of a rather cursory examination by J. B. S. Haldane, there has been no mathematical study of selective processes on genetic [illegible], which though of benefit to the group as a whole would bring some extra peril to the individual, as would for instance altruistic tendencies. There would here be a negative selection of the individual within the group, but a positive selection of the altruistic groups in which such individuals were of frequent occurrence. However that may be, Allee's view, that the coöperation and organisation involved in human civilisation are not of accidental growth but rest on fundamental biological tendencies, is compelling. He considers that scientific modes of thought may be applied to the solution of problems hitherto believed to be solely in the domain of religion. *Animals, it is evident, not only struggle with each other for ascendancy, they coöperate.* Human beings are driven by inherent tendencies to organise and build up communities as well as to fight and disrupt them. Every society of human beings we know of has exhibited these cooperative tendencies: we may assume them to be innate in the human animal. Goodness and mercy may be biologically as ingrained as hatred and aggression: nature red in tooth and claw, where only the strongest or cleverest survive, must be balanced by nature with its peck-order established and social ethics triumphant. It may be contended that there is a considerable gap between coöperation in a peck-ordered flock and kindness or altruism among the citizens, say, of Chicago, where Allee pursues his researches; and that science has hitherto been sensible enough to keep off ethics. The former objection is a strong one, only to be confuted by evidence (which is not yet, of course, available); the latter would be convincing if science never changed its habits, or if the habit in question were a fundamental method of science. It is true that science has refused to draw ethical conclusions or to be influenced, when drawing conclusions, by ethical considerations. Goodness and mercy are not subjects on which science has hitherto had anything to say (though scientists have been influenced by them when devising their investigations). At most these virtues have been studied as part of the subject matter of human psychology. But if Allee is *right biology may show how far tendencies to be merciful* and helpful are valuable in conducing to survival, not because they derive from a categorical imperative and have divine sanction but because they represent necessary inherited features in the members of highly organised and enduring animal communities.

There is nothing startling in such a suggestion. The kalonkagathon can be as properly the subject of scientific study and definition as can health or truth or other harmonies that give delight. The transition from "goodness" to "survival value" ("good behaviour is that which is valuable for survival") is a conceivable one, and proceeds less per saltum than that other inference from "indeterminacy" to "freewill," about which the physicists and the metaphysicians were lately busy. But before science can study goodness and other such "value-concepts" it must define them; and define them in terms which it can operate—no small task and one beset with such gins and snares as ignoratio elenchi, argument from analogy and other ambuscades of fallacy. If we can agree about some axioms, however—and even the most abstract mathematicians have to agree on some non-deducible axioms—there is no reason why we should not enter this new field of scientific inquiry, and be led to some useful conclusions.

* * *

It is strange how many of my middle-aged medical friends, in times of harassment, think of the day when they will be able to retire, and how many never attain that object, but carry on to the end. It is strange, too, how many are wedded to Nature, and want to dwell in peace in the country or within view of sea or loch; men whose days have been intimately bound up with all the amenities and drawbacks of town and city life. "A nice little cottage is all I want," one hears a tired man say, adding quickly, "with a little bit of garden, of course." I wonder how many of these dream cottages there are with latched gates, hollyhocks and the song of near-by blackbirds, where a man sees himself in the evening of life, sitting back enjoying that well-earned rest before the night bell rings to summon him to his final consultation. I hope there are many such; at least enough to spangle the hodden gray of professional worry wtih the colourful threads of sobered romance. For thinking about these things is as far as most of us will ever get.

Parliament

ON THE FLOOR OF THE HOUSE

MEDICUS M P

THE War situation has been transformed during the recess by the capitulation of Italy and in his two-hour-long statement to the House the Prime Minister covered both military and political aspects of war, and the crucial question how to root out Nazi and Fascist organisation in the countries of Europe. The debate which followed opened up a new vista of intense struggle on the field of battle and of immense problems on the field of the transition from war to peace. Mr. Ernest Bevin's survey of the man-power situation has underlined the "titanic struggle" he foresaw in 1914. It is in this perspective that other events and discussions on the floor of the House, in the Committee rooms and in the rooms of Ministers, must be considered.

The planning of a unified and comprehensive medical service, the improvement of urban housing and the provision of more cottages in rural areas are milestones on the way to the postwar world. But Mr. Ernest Brown is not likely to produce a white-paper on his medical proposals for about two months and definitive urban housing proposals may have to wait longer still. The immense demands of the Services for labour and material prevent any large-scale plan of repair and rehabilitation of urban houses unless the urgency is beyond dispute. The question [illegible] Health will be to decide [illegible] Recent increases in [illegible] of houses up to £200 per house are a concession, but not a solution of the difficulty. The overcrowding in London, Glasgow [illegible] the report of the Ministry of Health just issued shows a good standard of health. That is apart from tuberculosis and venereal disease. The explanation may lie in the increase of income received by a large majority of weekly wage-earners over the 1938 levels, and particularly in an improvement in the food consumption of a large proportion of infants and school-children. Occupants of [illegible] removal of a serious grievance, but will help to relieve financial pressure, which was beginning to be a serious factor in health and morale. No date has yet been fixed for the beginning of the work of the pensions appeal tribunals. The delay has been caused by the decision of the Lord Chancellor, by whom appointments to the tribunals are made, that the work cannot begin until the new warrant is printed and available for all concerned. The revision of the warrant brought about by Parliamentary pressure before the recess is very far-reaching. The delay is not likely to be great and the tribunals should certainly be working in November.

A matter of which more will be heard in the House when it reassembles after a further recess—which many members on all sides of the House resented—is the famine in India. This is not confined to Bengal and is not to be explained as wholly due to hoarding. The solution is to regard the famine as an A1 priority and to allocate shipping to bring in wheat and other foodstuffs from the nearest convenient countries. The transport situation has been somewhat eased as the result of the Mediterranean victories and the victories of ship-building in British, Canadian, and especially USA yards, but it is not yet easy. Famine, however, and possible pestilence are not aspects of the war situation which can be postponed for future consideration. Civil security in India is one of the main foundations of the offensive against Japan.

Replying to a question, Mr. R. A. BUTLER said: The Minister of Food and I are proposing in the near future to conduct a census of the type of milk supplied to all schools in order to make provision for heat-treated or tuberculin-tested milk where this is practicable and desirable and where neither of these types is now supplied.

FROM THE PRESS GALLERY

Older Women for War Work

IN the debate in the House of Commons on Sept. 23 and 24 on man-power policy, the Government's proposal to call up women between the ages of forty-five and fifty was fully discussed. Mr. ERNEST BEVIN, the minister of labour, reminded his critics that in dealing with man-power the real battle for final victory had not yet begun. The Government would not be doing their duty if they either gave way to sentiment at this stage of the war or failed to take every precaution, whatever class of citizens might be affected. It was in that spirit, and he hoped impartially, that the Cabinet had faced this difficult, but important, turn of the screw, which would not have provoked a debate when danger loomed so large in 1940–41. Mr. Bevin claimed that the agitation over the calling up of the older women ought not to be attributed to the women. He was not impressed by the medical argument. He had registered nurses and midwives up to sixty and nobody made a single protest. There were 1,600,000 women between forty and sixty in employment at present, and of these 500,000 were between forty-six and fifty. No distinction must be drawn between women who had always gone to work and other classes. He would also have to direct boys of sixteen and seventeen to the aircraft industry. Mr. Bevin recognised that great care must be exercised in calling up the older women, and he promised that health difficulties would not be forgotten. The Government were gravely concerned about the effect of long bus queues on the health of the people, and they expected to be able to add to the number of vehicles available for public transport. To do this, several thousand bus conductors would be needed. There was also a special call for more nurses and midwives. He was hoping soon to get the report of the Hetherington Committee which would enable him to deal with the provision of more domestic help in hospitals. The registration of nurses and midwives brought in 400,000 persons. By the end of August nearly 3000 nurses had been placed in training or employment, and recruitment was continuing at the rate of about 300 a week, mainly among married women up to 60 years of age who were returning to their profession at this critical time.

Mr. CRAIK HENDERSON had had letters from dozens of doctors showing that the effect on women of the older ages of merely being called for registration, and perhaps having to go before appeal committees, would be serious. One of his medical correspondents said:

> "Besides, these women—very many suffer from nervous exhaustion, rheumatism, cardiac disorders, anæmia and insomnia—are physically unable to undertake any additional duties. Already they are harassed by shopping (long waiting in queues) and housework single handed; and many can hardly manage that efficiently. If additional burdens are forced upon them it will certainly not be long until health breaks down. As a result morale will be lowered in the family circle and resentment spread, with impairment to the war effort."

Another doctor said that there would be an enormous increase in factory accidents due to the attacks of vertigo to which women were prone at this age. But Miss M. LLOYD GEORGE had support from some women members of the House when she expressed the view that Mr. Bevin's proposal could be put into effect "without putting an intolerable burden on the women." Mrs. J. [illegible] countess DAVIDSON thought that women up to fifty or even older were perfectly capable of doing any work if they had the time to do it in addition to their other responsibilities, but she pleaded that interviewers should realise the importance of not breaking up homes. Viscountess ASTOR felt that it was a pity to have to call these women up, and she appealed to the Minister to "go slow" in dealing with them. Sir HENRY MORRIS-JONES described the proposals as "a definite blot on the Minister's escutcheon and record." The Government [illegible] calling up the older women, [illegible] vaste of personnel at younger [illegible] tegories of women, disturbances occurred which were inevitable owing to their age. There was a psychological factor involved which existed a million years before any minister of labour was known.

On the second day Dr. **RUSSELL THOMAS** regretted that the medical aspect of this matter had been put in the background. Great changes were occurring in the bodies of women in the age group forty-five to fifty which they did not get over in a day, and he suggested that older women and men might well be more suitable for work. Miss E. **RATHBONE** thought Dr. Thomas had overstated his case, but admitted that there was a difficult period in a woman's life, though it by no means necessarily coincided with the years of forty-five to fifty-one. The Minister would have done just as well however, from the medical point of view, if he had exempted women in that age-group and taken his registration from the ages of fifty-one to sixty, or even sixty-five. These later years were often the most healthy periods of a woman's life, because her constitution had then settled down. Therefore, she hoped that the Minister would not stop at fifty or fifty-one if he must continue his registration.

Mr. M. S. **MCCORQUODALE**, parliamentary secretary to the ministry of labour, gave a further assurance on behalf of the Government that physical fitness, which assumed special importance in connexion with these age-groups, would be treated sympathetically. If a doctor's certificate was not clear, or if any other circumstance presented doubt, it might be arranged that a woman should have an independent examination, but the normal practice in these age-groups would be to accept a medical certificate without hesitation.

QUESTION TIME

Medical Man-power

Sir **ERNEST GRAHAM-LITTLE** asked the Minister of Health what body was now responsible for the allocation of doctors for civilian services and the fighting services, respectively; what was the relationship between the Central Medical War Committee and the British Medical Association; and how far this committee was subordinate to the Shakespeare Committee in respect of the allocation of medical man-power.—Mr. E. **BROWN** replied: The Medical Personnel (Priority) Committee of which Sir Geoffrey Shakespeare is chairman, is responsible for advising, within the limits of any direction that may be given to it by the Government, on the number of doctors to be allocated to the civilian and fighting services and on matters incidental thereto. The Central Medical War Committee is related to the British Medical Association only to the extent that its secretariat and offices are provided by the association and that about two-thirds of its members are office-holders or nominees of the association. The Central Medical War Committee amongst other functions advises on the selection of individual doctors for allocation to the various services and is not subordinate to the Shakespeare Committee except in the sense that it must conform with the recommendations of the latter committee as adopted by the Government.

A Medical Officer's Widow's Pension

Mr. Q. **HOGG** asked the Secretary of State for War whether his attention had been drawn to the case of the late Mr. W. B. Highet, an orthopædic surgeon of great ability employed at the Wingfield-Morris Orthopædic Hospital, who volunteered for service in a special appointment in South Africa, carrying a major's rank, at the urgent request of certain military medical authorities, but was commissioned with the rank only of lieutenant and died by enemy action at sea before taking up his appointment; and whether he would so use his dispensing power under the warrant as to ensure his widow and child, now almost destitute, a pension comparable with his status in the profession and the work on which he was employed.—Sir **JAMES GRIGG** replied: A vacancy on an establishment is not regarded as filled until the occupant assumes duty. This officer was commissioned as a lieutenant and there is nothing to show that he was promised any other rank before he took up his appointment in South Africa. I sympathise with his wife and family and with the efforts made on their behalf.

Mr. **HOGG** gave notice that in view of the unsatisfactory nature of the reply he would take an opportunity to raise the matter again on the adjournment of the House.

Carbon-monoxide from Gas Producers

Wing-Commander N. J. **HULBERT** asked the Parliamentary Secretary to the Ministry of War Transport if he was aware of a number of cases of indisposition of conductresses and other personnel due to poisonous fumes from gas-producers towed by motor-omnibuses; to what extent this accounted for reluctance on the part of operators to use these plants; and if he was taking any steps to remedy this failing.—Mr. **NOEL BAKER** replied: My attention has been called to one case in which two conductresses were apparently affected by carbon-monoxide gas from a producer-gas unit attached to a public-service vehicle. The cause is being investigated, and the producer-gas unit concerned has been withdrawn from service. I am not aware that danger from carbon-monoxide is deterring any operator from using gas-producers. The danger is slight, particularly in the open air, but the attention of all public-service vehicle operators has been drawn to the matter to ensure that the necessary precautions are taken by them. The matter is also dealt with in the instruction book which will be distributed with each producer-gas unit allocated to goods-vehicle operators.

Hospital Accommodation in Scotland

The number of staffed beds in general hospitals in Scotland represents about 7·8 beds per 1000 of population. This figure excludes beds in sanatoria, mental and isolation hospitals and private institutions. Beds specifically reserved for tuberculous cases number about 1·2 per 1000 of population.

[Mr. J. **WESTWOOD** replying to Mr. W. H. **MAINWARING**.]

Vitamin Concentrates for Greece

Mr. D. M. **FOOT**, parliamentary secretary to the Ministry of Economic Warfare, informed Sir W. **SMILES** that monthly shipments of milk to Greece were increased in July from 300 metric tons of condensed milk to 600 tons. Shipments of vitamin concentrates since April had consisted of 1540 lb. of 'Betalin' tablets, containing vitamin B, 823 lb. of 'Cenalin' tablets containing vitamin C, 540,000 yeast tablets containing vitamin B and 1725 kg. of vitamin A and vitamin D. In addition, approval had been given for monthly shipments since April of 25 tons of cod-liver oil, and there had also been a single extra-ordinary shipment of 1484 lb. of concentrated fish-liver oil.

Infectious Disease in England and Wales

WEEK ENDED SEPT. 18

Notifications.—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 2639; whooping-cough, 1531; diphtheria, 723; paratyphoid, 8; typhoid, 7; measles (excluding rubella), 491; pneumonia (primary or influenzal), 365; puerperal pyrexia, 198; cerebrospinal fever, 44; poliomyelitis, 16; polio-encephalitis, 2; encephalitis lethargica, 2; dysentery, 268; ophthalmia neonatorum, 81. No case of cholera, plague or typhus fever was notified during the week.

The number of civilian and service sick in the Infectious Hospitals of the London County Council on Sept. 15 was 1774. During the previous week the following cases were admitted: scarlet fever, 240; diphtheria, 45; measles, 14; whooping-cough, 43.

Deaths.—In 126 great towns there were no deaths from measles or scarlet fever, 1 (0) from an enteric fever, 12 (1) from whooping-cough, 9 (0) from diphtheria, 68 (13) from diarrhœa and enteritis under two years, and 9 (0) from influenza. The figures in parentheses are those for London itself.

Bristol reported the fatal case of enteric fever. Liverpool had 6 deaths from diarrhœa. There were 3 fatal cases of whooping-cough at Manchester.

The number of stillbirths notified during the week was 197 (corresponding to a rate of 32 per thousand total births), including 28 in London.

Dr. M. M. **WALKER** has been appointed an assistant medical officer in the Colonial Medical Service at Jamaica.

A new series of Sunday evening health talks starts at 7 PM on Oct. 3, with the same title as the series which ran in the early summer: "Doctors Agree." "Health Magazine" at 10.45 AM on Oct. 1 contains a talk on the change of life by a woman doctor, and a talk on common health superstitions by a medical psychologist.

THERE will be a second showing of the film *Surgery in Chest Diseases* at the Curzon Cinema, on Monday, Oct. 11, at 5 PM. Applications for seats should be sent to the film department of the British Council, 3, Hanover Street, London, W.1.

Letters to the Editor

CHRISTMAS AND THE RMBF

SIR,—It is my custom each autumn, through your columns, to invite my medical colleagues to take their part in the Christmas Gifts fund of the Royal Medical Benevolent Fund. This scheme, so generously supported by many, has become very remarkable; not only has it been the means of bringing to many old and lonely people a gift of friendship and sympathetic understanding at Christmas time, but it has also given many of your readers an insight into the great work which the Royal Medical Benevolent Fund is doing daily in helping medical brethren, or the widows and children of deceased medical practitioners, who are in financial difficulties.

We look upon the Christmas gift of £2 to each beneficiary as something "extra," but I must emphasise that the regular allowances have to be paid throughout the year. New annual subscribers are very urgently needed for our general funds, and surely it is for the present generation of practitioners to take up their share in a work which is a common professional inheritance and tradition.

It is not difficult to realise what happiness and comfort a Christmas gift of £2 brings to an old doctor, an aged widow or daughter living alone, possibly suffering from illness or infirmity. We ourselves know the difficulties and discomforts of our own lives caused by the present war. May I appeal, Sir, very earnestly on behalf of those who have suffered so much more than ourselves? I venture to make this letter a *twofold* appeal: (*a*) to all regular subscribers, to send their "extra" for the Christmas Gifts fund; (*b*) to all others, to show their practical sympathy by becoming subscribers to our general funds. I do not ask for large contributions.

Christmas gifts donations should be marked "Christmas Gifts," and all cheques made payable to the hon. treasurer, Royal Medical Benevolent Fund, 1, Balliol House, Manor Fields, London, S.W.15.

THOS. BARLOW,
President.

TUBERCULOSIS NURSING

[illegible] pt. 4 [illegible] at a [illegible] how to nurse tuberculosis in any but its incurable stage, and yet we are making a supreme effort to find and treat patients before they reach such a stage. When she goes to a sanatorium as a nurse (or, if less fortunate, as a patient) she is astonished to find how much there is to [illegible] or even 10 years ago, and to meet these altered conditions the nurse needs a special training which cannot be acquired in a three-months visit to sanatorium or tuberculosis [illegible] fever cases and mental case[illegible] registration of those who [illegible] is even more necessary for those who nurse tuberculosis, which still ranks high among fatal diseases. Dr. Ellman's arguments support rather than detract from the value of [illegible] of tuberculosis n[illegible] Dr. Houghton's la[illegible] in the existing sy[illegible]an utopian ideal.

Wokingham, Berks. WM. C. FOWLER.

NEUROSIS AND INTELLIGENCE

SIR,—Dr. Eysenck's article of Sept. 18 raises a point that is usua[illegible] which migh[illegible] his results [illegible]

Some 15 [illegible] thesis (Bra[illegible] the chronic [illegible] of subevolu[illegible] "amentias [illegible]tias"), I did intelligence tests on a large number of certified patients of various types in the mental hospital. I was looking for psychological verification of this thesis and in view of Hollingworth's findings in psychoneurotics expected to have a fairly easy task. To my surprise the results were so erratic and irregular that I did not think them worth publishing. In [illegible] tion I realised one source of [illegible] to obtain some standard of [illegible] tests (Binet, picture completion, Burt's reasoning test, Porteus) on an unselected sample of the nurses and attendants at the same hospital whom I took to be a comparable social and intellectual group. With these I found that the scores were very greatly influenced by age, being comparably much lower with the older persons. This effect was so great that it quite swamped the variation I was looking for. (Some of the results were quite startling [illegible] a man [illegible] service. [illegible] test an[illegible] reasons for this great reduction of performance with advancing age are many (the naïve trusting outlook of children in these tests as contrasted with the varying attitude of adults unused to such "inquisitions" is one that shows up clearly), but whatever they are the effect must be allowed for in any investigation on adults. It could be avoided by studying the problem in children, where moreover the tests are more relevant. There must be plenty of material today in the numerous child-guidance clinics. Perhaps there one might get corroboration of my general impression, shared by most child psychiatrists, that true neurosis has little to do with intellectual level.

Leeds. HARRY EDELSTON.

SCIENTIFIC FREEDOM IN GOVERNMENT SERVICE

SIR,—Sir Edward Mellanby is not alone in thinking that the dominant factor in deciding health legislation has often a political rather than a scientific basis and that the great delay which often occurs before the results of scientific progress are adopted is sometimes due to administrative inertia or to lack of political or social interest.[1]

The Civil Service has many excellent qualities, but it w[illegible] to say that it is by tradition or [illegible] science or enthusiastic in the [illegible] teaching. Administrative reaction is influenced to a considerable extent by political expediency. Politics has been defined as "the art of the practicable," which means that expediency is bound to be the governing consideration and that wisdom may have to take second place to prudence. Compromise and science are unhappy bedfellows; and the administrator can always find many good reasons for doing nothing. The guiding principle is that nothing must be done or said or written that is likely to embarrass a Minister and, since any form of progress is likely to cause a certain amount of upheaval, science is apt to be regarded with suspicion. There are stringent Treasury regulations affecting the freedom of speech of civil servants and their liberty to publish without prior authority. A doctor working in the Civil Service is, in fact, effectively gagged; he can say or write only what has official approval. There is an administrative tendency, not confined to any particular Ministry, to regard the scientist as one whose job it is to provide his political chief with titbits with which to garnish a speech on the Estimates.

There may be good reasons for all this—it may even be an inescapable feature of democratic government—and presumably a doctor who becomes a Civil Servant does so with due recognition of what he is surrendering in return for his established position; but it is scarcely surprising that many have found themselves bewildered and shaken in an environment far removed from that of science, one in which a frank statement of ignorance on a specific point is often regarded as something little removed from official sin. It is difficult for a doctor in the service not to become isolated from his professional work and, consequently, a diminishing asset to the state. It is not easy to preserve a scientific outlook in such a setting, and it must be demoralising to find that the only certain way to further the development of a line of action scientifically desirable is to stimulate in the market-place an agitation in that direction which will in time make itself sufficiently insistent to provoke political activity—almost always a response to stimulation from the periphery. To be ahead of the times often spells political suicide.

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[1] Recent Advances in Medical Science, London, 1939.

The relationship of the doctor to state control is of particular importance at this time. Recently there has been an expressed determination not to become subject to the anonymity of Whitehall; but experience teaches that this may be very difficult to avoid. Sir Stafford Cripps believes that there is a need to increase the volume of research, both basic and applied, and at the same time to introduce some measure of planning so as to make the best use of available resources. He considers that we need a State Scientific Service apart from but on a parallel with the administrative Civil Service. Medicine must never allow itself to be put in a position which would involve the suppression of some scientific findings because they happen to be inconvenient or inconsistent with a Government policy, nor must it ever consent to become standardised and regularised along Civil Service lines. Any such development would be contrary to the interest of the profession and contrary to the interest of the public. It is not sufficient to secure airy Ministerial protestations of good intentions in matters so fundamental to the well-being and self-respect of the profession, and there must be effective guarantees that, whatever its administrative structure, the medicine of tomorrow will secure for its workers freedom of thought, freedom of expression, and freedom to practise medicine according to its lights.

ARGUS.

HOSPITAL SAVING

SIR,—Something seems to have gone astray in the reasoning of your leader of Sept. 25. "If ordinary hospital saving schemes go on," it states, "the whole conception of a single all-embracing insurance contribution will have been lost." Why? "In a comprehensive service," it continues, "the only legitimate function of saving schemes is to supply extras." Can it be that the *Lancet* has fallen into the popular error about "hospital saving"? The legitimate function of saving schemes always has been to save the voluntary hospitals. Even if the payment made by the National Security Fund and the "hotel fee" meet the full cost of maintenance in the voluntary hospitals, there will still be need for men of good will to assist with the capital expenditure to save them from extinction and why should the *Lancet* want to stop them? It is unjust to a large proportion of the contributors to regard them merely as members of an insurance scheme. There is an enormous volume of voluntary work and keenness to maintain the voluntary spirit. Up and down the country there is evidence of it. The latest example in London was the gift made by contributors to the HSA to mark its twenty-first birthday—£12,000 raised spontaneously in a few weeks for scholarships for nurses.

Why should not the contributors have a free choice of hospital, and if contributing to a scheme facilitates admission to a voluntary hospital why should they not do so? Instead of securing "extras" it is as likely as not that the contributor may find some material respects in which he is at a disadvantage as compared with the patient in a municipal hospital. It may be just sentiment which stimulates him to want to go into a voluntary hospital, but he gives expression to it in a practical way, and sentiment is not without its healing balm.

London, S.E.24. C. E. A. BEDWELL.

VOICE OF MEDICAL SUPERINTENDENTS

SIR,—Most, if not all, of the suggestions made public for the future organisation of the health services of this country envisage some means for ventilating the views of the profession. Doubts, however, are felt over the machinery necessary to make the ventilation of those views efficient. That this is a matter of urgent importance is illustrated by the attitude of the British Medical Association itself and of prominent representatives. Thus, Professor Picken said at a recent conference that it was expected that medical officers of health would voice the opinions of municipal hospitals. Medical committees, boards, and so forth, are advocated, but there is a curious and significant omission of all reference to existing or future whole or part time officers of local authorities as such, apart from the medical officer of health. Medical superintendents have experience in public hospital administration, in infectious and in mental diseases shared by few others; is this experience not to be made available because they are whole-time officers?

ERNEST C. HADLEY,
Hon. Sec. Medical
Superintendents Society.
Leicester.

MEDICAL AUXILIARIES

SIR,—The Council of the Board of Registration of Medical Auxiliaries of which we, the undersigned, constitute the medical members, would draw the attention of the medical profession to the objects for which the board was formed in 1936, and to ask for the full cooperation of the profession in the use of the register. Medical auxiliary work is taking an increasingly important part in the treatment of disease; yet, at present, it is open to anyone, qualified or not, to practise this type of work. The purpose of the board is to provide a register of qualified persons who are guaranteed to have undergone an adequate course of training, passed a recognised examination, and undertaken to maintain a good ethical professional standard. By consulting the register doctors or members of the public may assure themselves of the training and status of the person whom they employ for medical auxiliary work.

The board itself is a body composed of duly appointed medical practitioners and representatives of each recognised branch of medical auxiliary work. It has provided a standard register of the following groups: chartered masseurs/euses; radiographers; biophysical assistants; dispensing opticians; chiropodists; orthoptists and speech therapists—and can confidently recommend to the medical profession and the public those persons who are on its register. Support has been given us by many hospitals, public bodies and individual practitioners, but there is need for the whole medical profession to make use of the register if it is to serve to the full the purpose for which it was instituted.

Though at present, owing to the war, it is impossible to publish the register in full each year it is possible to supply any practitioner with information as to the qualifications of persons on the register. Inquiries should be addressed to the secretary of the board at BMA House, Tavistock Square, W.C.1.

V. ZACHARY COPE,
President.
C. B. HEALD,
Vice-President.
L. VERNON CARGILL,
Treasurer.
L. D. BAILEY.
E. J. BOOME.
W. MCADAM ECCLES.
A. P. GIBBONS.
CHARLES LEONARD GIMBLETT.
NORMAN C. LAKE.
D. D. MALPAS.

Obituary

EDMUND CYRIL SMITH

M D DUBL, M R C P, D P H, D T M & H

THE death through enemy action of Dr. E. C. Smith senior pathologist to the medical laboratory service in Nigeria, is announced. He qualified from Trinity College, Dublin, in 1921 when he was awarded the Bennett medal and a surgical travelling prize which enabled him to visit the medical school of Vienna. As pathologist at the Sir Patrick Dun's Hospital and the Mercer's Hospital he gained further experience in his specialty before taking his DTM & H in 1927 and joining the Colonia Medical Service. A colleague writes: There are few aspects of pathology in West Africa which Smith's work has not helped to illuminate while his *Atlas of Skin Diseases in the Tropics* and his *Introduction to Pathology and Bacteriology* for African students will long remain essential books for all who deal with illness south of the Sahara. Though official recognition lagged behind Smith had earned an international reputation and hardly a medical officer of whatever nationality who found himself in Lagos failed to make the pilgrimage to the Medica Research Institute at Yaba. When war came Smith was anxious to join the Army but his work at Yaba was important not only for the health of the civilian population but for the Army Medical Services themselves

When these services were still in embryo his help with
media, was invaluable;
and he lasses in tropical
medicin medical officers.
Yet it is not only as a competent pathologist that
one of the most
He was perhaps
ses and flowering
shrubs or in his bungalow surrounded by his dogs and books listening to the music he adored.

THE LATE SIR WILLIAM WHEELER

IN a brief memoir of Sir William Wheeler, which appeared in our last issue, it was stated that soon after his return from Ireland in 1932 he joined the surgical staff of the newly opened Southend General Hospital. Here, writes R. M., he brought to the problem of the hour a rich experience in hospital affairs gained in many parts of the world. There were few medical schools and clinics he had not visited, few leaders in surgery of his day that he had not met or known personally, and no surgical or administrative circumstance that he could not illustrate with anecdote—usually with a humorous twist. He was fond of recounting his experi-

after a long day in the operating room, sitting by the
fireside
and d
ing or
time,
intrat
stomach; of happy, lazy, care-free holidays spent fishing or walking in his native land, or of a devoted surgical sister who used to assist him with many of his operations.

A diagnostician before anything else, Wheeler was a strong advocate of the investigation of patients in hospital wards rather than in the outpatient department. He was horrified if his house surgeon admitted a patient one day for operation on the following day. He insisted that every case, emergencies of course excepted, should be completely overhauled whilst in hospital, and that such simple cases as inguinal hernia, interval appendix and hæmorrhoids needed at least seven days in bed with adequate preoperative study and treatment. For each one of his patients he felt a close personal responsibility and this led him to discuss the relative merits of small and large hospitals and to conclude that 400–450 was the ideal number of beds in one building if this close relationship was to be maintained.

Whee ducation of our
nurses a more intensive
clinical uraged all the
nurses in his wards to go with him while he was doing his surgical rounds, which were always well attended by local doctors and distinguished visitors. He was at his best when called into consultation by his colleagues to give an opinion on a baffling case. Here his wide range of knowledge, his thoroughness in examination of the patient, his critical faculties and his quick grasp of all essentials proved of inestimable value to all concerned.

Dr. GEORGE H for Ulverston
for 50 years, die few days of
his eighty-sevent his medical
education at St. aking MRCS
in 1879 and the DPH in 1896. He was in general practice in Dalton-in-Furness, when in 1880 he was appointed part-time MOH of Dalton urban sanitary district and twelve years later whole-time MOH of the Ulverston combined sanitary district.

On the eve of St. Luke's Day, Sunday, Oct. 17, at 8.40 PM, Sir Norman Birkett will appeal for medical missions in Africa as the week's good cause. Before the appeal, at 8 PM, Dr. Clement Chesterman, secretary of the British Advisory Board on Medical Missions, will conduct a religious service and speak on impressions and experiences of a medical missionary in Congo. Contributions to the appeal should be sent to Sir Norman Birkett, at 2, Eaton Gate, London, S.W.1, marked BBC Appeal.

Notes and News

CLINICAL PHOTOGRAPHY

AT a meeting of the Association for Scientific Photography on Sept. 18 at the Middlesex Hospital, Dr. H. MANDIWALL enumerated the qualities required in clinical photography. They were, he thought: (a) a simple straightforward record with perfect definition; (b) a self-explanatory picture which
di print, as
we in colour
photographs, the colour must be true to the original. Colour is of course particularly important in skin diseases. He
ments of clinical photography often differ from those of studio or outdoor work, and it would be an advantage to have apparatus designed for the work.

Mr. T. POMFRET KILNER, FRCS, thought standardisation in technique important, especially in his own sphere of plastic surgery. The photographs taken before and after treatment required to be strictly comparable as regards type of film,

documents.

Miss HILDA MARSDEN showed examples of the work done in clinical photography at the Christie Hospital, Manchester, using a half-plate camera with studio technique. She laid special stress on the importance of lighting, particularly in delineating the outline of growths

In the discussion which followed, Mr. ANDREWS (LCC) showed illustrations of a convenient set-up for photographing patients in bed, made with the aid of a pair of steps of the sort available in any hospital. The camera was fitted to the top of the steps with the usual ball and-socket joint and could be directed to the required position. By means of inter-

lens was adequate for full-length and an 8 in. for head and shoulders. A 14 in. lens gives a close up of any part of the body with the patient lying flat about 5 ft. below the camera. For interest, he showed a photograph of a patient with one brown eye and one blue, taken with orthochromatic film without a filter. Only one photoflood lamp was used and the colour rendering was very good

Mr. HENNELL (Metal Box Co) said that he had taken several thousand clinical photographs in colour during the war, using 'Sashalite' bulbs exclusively for illumination. He agreed
advantageous to make a special study of physiology and anatomy. A doctor or surgeon could not reasonably be expected to do his own routine photography. It was pointed out that most hospitals were equipped for X-ray work but not for clinical photography.

Those interested in the formation of a clinical photography section should write to the secretary of the association, Mr. R. M. Weston, at Houndwood, Farley, nr. Salisbury, Wilts

NEW TB FILM

WITH the advent of mass miniature a new sound film called *Defeat Tuberculosis* has been made at the request of the Ministry of Health by the Ministry of Information. It is intended for exhibition to the general public, stresses the need for seeking treatment early, and illustrates modern methods of diagnosis and treatment of tuberculosis. It takes 10 minutes to run, but it cannot be shown on silent projectors. Local authorities and organisations can borrow copies, in sizes 16 mm. or 35 mm. sound, for showing to non-theatrical audiences, from the Central Film Library, Imperial Institute, South Kensington, S.W.7. In the South Western Region, the application should go to the Film Library of the South West, Dartington Hall, Totnes, S. Devon. Until the end of December the film is also being included in the programmes of the Ministry of Information's travelling
shing to arrange shows
the Ministry of Informa-

IMPORTANCE OF HOSPITAL CONTRIBUTORY SCHEMES

UNDER this heading, in a 16-page booklet entitled "800 Years of Service" issued by the British Hospitals Association, appears the following paragraph:

They are a living testimony to the close co-operation between the hospitals and the general public. Over ten million working men and women are members of these schemes and have a direct personal interest in the hospitals which they support out of their wages and to which they know they can look for help in time of sickness and trouble. Although originally intended to link up a contributor with a particular hospital, it may happen that there is no vacant bed when required, or the need may arise when he is away from home. In such cases, he would be admitted either to a municipal hospital or to another voluntary hospital. Thus a contributor can obtain treatment whenever or wherever the necessity arises.

FOR THE MEDICAL LIBRARIAN

To us in England, with so many of our libraries either in ashes or in hiding, a full and instructive Handbook of Library Practice (American Library Association. Pp. 609. $5) comes like a voice, not untinged with irony, from another and happier world. The heading "Book selection and ordering" recalls Glendower's "I can call spirits from the vasty deep," and Hotspur's flippant reply "—but will they come when you do call for them?" The wealth of detail is perhaps rather overwhelming. It is, for instance, hardly necessary to tell the librarian that in "alphabetizing" (*pace* A. P. Herbert) the catalogue of periodicals the word "the" in a title may be disregarded; and the suggested cross-references "eye, see optics" and "optics, see eye" might surely have occurred to him unaided. But covering as it does every aspect of library management the book is valuable; and the chapters on rare books and reference works are especially worthy of mention.

University of Cambridge

Dr. A. L. Fawdry has been approved for the degree of MD in absence.

During July and August titles of the degrees of MB, B CHIR were conferred on J. Hardy, V. U. Lutwyche, E. M. Senior, and A. B. Willcock.

University of Leeds

The inaugural lecture of the faculty of medicine will be given by Sir John Graham Kerr, FRS, MP, emeritus professor of zoology in the University of Glasgow, on Wednesday, Oct. 20, at 3.30 PM. He will speak on medicine and education.

Royal College of Surgeons of England

Air-Commodore P. C. Livinston will deliver the Moynihan lecture at the college, Lincoln's Inn Fields, London, W.C.2, at 4 PM on Tuesday and Wednesday, Oct. 5 and 6. He will speak on visual problems of aerial warfare.

Two Imperial Cancer Research Fund lectures will be delivered at the college on Oct. 7 and 14, at 3.30 PM. Mr. H. G. Crabtree, AIC, will give the first, speaking on metabolic disturbances and the cancer problem, and Prof. W. E. Gye, FRS, the second on the problem of chemotherapy in cancer.

Pharmaceutical Society of Great Britain

The 101st session will be opened on Wednesday, Oct. 6, at 3 PM, at 17, Bloomsbury Square, London, W.C.1, when Mr. W. S. Howells, the president of the society, will deliver the inaugural address.

Society for the Study of Inebriety

On Tuesday, Oct. 5, at 4 PM, Dr. A. Ninian Bruce will deliver the nineteenth Norman Kerr lecture at Westminster Hospital medical school, Horseferry Road, London, S.W.1. His subject is to be alcohol and avitaminosis.

Faculty of Radiologists

The radiotherapy section will meet at 10 AM on Saturday, Oct. 16, at 32, Welbeck Street, London, W.1, when Dr. J. L. Livingstone, Mr. R. C. Brock, Dr. Ffrangcon Roberts and Dr. J. L. Dobbie will open a discussion on the treatment of carcinoma of the lung.

Westminster Hospital

On Monday, Oct. 4, at 3 PM, Mr. Ernest Brown will deliver the opening address of the new session at Westminster Hospital medical school. He will speak on the nation's health and the future.

Royal Society of Medicine

The section of pathology will meet on Tuesday, Oct. 5, at 4.30 PM. On Oct. 6, at 2.30 PM, Sir Walter Langdon-Brown will deliver his presidential address to the section of history of medicine. His subject is to be William Heberden and the age of reason, and it is one of a series of chapters in Cambridge medical history. On Oct 8, at 3.15 PM, at the clinical section Dr. J. D. Rolleston gives his presidential address. He will speak on the Clinical Society of London. At the section of ophthalmology on the same day at 5 PM there will be a discussion on burns of the eyelids and conjunctiva. The opening speakers are to be Wing-Commander J. C. Neely, Squadron-Leaders G. T. W. Cashell, Mr. T. Pomfret Kilner and Mr. Frederick Ridley.

Medical Honours

The following awards have been made in recognition of gallant and distinguished services in North Africa to the following RAMC officers:

O.B.E.—Colonel G. W. R. Bishop, MB BRIST.; Lieut.-Colonel J. H. J. Crosse, MRCS; Lieut.-Colonel P. T. L. Day, MRCS; Lieut.-Colonel A. S. Hollins, MB CAMB.; Lieut.-Colonel R. G. M. Keeling, MRCS; Major W. A. Law, FRCS; Lieut.-Colonel Malcolm MacEwan, MB GLASG.; Lieut.-Colonel J. J. O'Connell; Major H. W. Rodgers, MRCS; Colonel C. H. K. Smith, MB EDIN.; Lieut.-Colonel J. Trotter; Colonel W. E. Underwood, FRCS.

MBE.—Major A. R. Clarke, FRCS; Captain C. J. Cobbe, MB LOND.; Major W. C. Gledhill, FRCS.

MC.—Captain G. S. Hodge, MRCS; Captain G. D. Park, MB GLASG.; Captain David Wright, MB GLASG.

Medical Casualties

The following RAMC officers have been posted as prisoners of war: Colonel John Bennet, MD EDIN.; Captain J. A. Mark, MB BELF.; and Captain T. B. Smiley, MB BELF.

Prof. EDWARD HINDLE, SC D, FRS, regius professor of zoology at Glasgow University, has been appointed scientific director of the Zoological Society of London.

IMPERIAL CHEMICAL INDUSTRIES have given £5000 towards the University of Oxford's appeal for £250,000 with which to found a department of ophthalmic research.

Appointments

BECH, A. O., MB CAMB., MRCP: acting medical registrar at the Middlesex Hospital.

OWEN, C. G., MRCS: MOH for Stone rural district, Staffs.

ROBERTSON, FRANK, MD DURH.: first assistant in the department of medicine at King's College and the Royal Victoria Infirmary, Newcastle-on-Tyne.

RUSSELL, P. G., MRCS: examining factory surgeon for Llanwrtyd Wells, Brecon.

Births, Marriages and Deaths

BIRTHS

HALL.—On Sept. 20, at Birmingham, the wife of Major G. S. Hall, RAMC—a son.

ISAAC.—On Sept. 18, at Oxford, the wife of Surgeon Lieutenant P. W. Isaac, MBE, RNVR—a son.

LASS.—On Sept. 4, in London, the wife of A/Squadron-Leader R. W. Lass, MRCS—a son.

ROBERTSON.—On Sept. 21, at Bletchingley, Surrey, the wife of Squadron-Leader Douglas Robertson—a son.

MARRIAGES

BURGESS—LE ROUX.—On Aug. 4, Gerald Lynch Burgess, MRCS, squadron-leader RAF, to Susie le Roux, VAD.

CANE—MILLAR.—On April 6, at Dar-es-Salaam, Tanganyika Territory, Leonard Hugh Cane, MB, to Margaret Millar.

EVANS—JONES.—On Sept. 22, at Liverpool, David Trevor Howell Evans, FRCS, to Susan Jones.

SCOTT—PAYNE.—On Sept. 25, at Addiscombe, David L. Scott, MRCS, Flying-Officer, of Leyton, to Margaret Payne, of Eastbourne.

DEATHS

COLLETT.—On Sept. 21, Howard George Collett, LRCPE, aged 30.

EDINGTON.—On Sept. 24, in Glasgow, George Henry Edington, MD, D SC GLASG., FRCS, FRFPS, DL, consulting surgeon to the Western Infirmary, Glasgow.

MORGAN.—On Sept. 23, at Hove, George Morgan, FRCSE, aged 83.

TATHAM.—On Sept. 25, at West Byfleet, Ernest John Tatham, MD CAMB., late of Cheltenham, aged 82.

The fact that goods made of
to war conditions are advert
as an indication that they

ARTHRITIS IN POLIOMYELITIS

F. JOHN POYNTON, M D LOND, F R C P LOND
CONSULTING PHYSICIAN TO UNIVERSITY COLLEGE HOSPITAL, AND TO THE HOSPITAL FOR SICK CHILDREN, GREAT ORMOND STREET, LONDON

[illegible] oliomyelitis are of considerable importance, and perhaps not [illegible] s might be supposed. It is to Miss Maud Forrester-Brown, surgeon in charge of the Bath and Wessex Orthopædic Hospital, that I am indebted for the opportunity to study them and indeed for calling my attention to them, when acting as a war-time consultant to this hospital.

As far back as 1881 Barlow pointed out that acute swelling ordinarily in one joint of the paralysed limb might arise synchronously with, or appear after, the development of the paralysis; that this swelling might reach a considerable degree and yet there might be no redness or heat. Further, it might persist for weeks or months. In 1910 Coutts added examples he had seen affecting the carpo- and metacarpo-phalangeal joints and compared the condition to the Charcot joint. This was denied by a speaker in the same discussion because of the great destruction in Charcot's disease, but it must be allowed that in diseases affecting the nervous system arthritic lesions need not of necessity be equally destructive. Brief allusion to the arthritis in poliomyelitis is made in some English works on children's diseases and I have no doubt that in other countries this arthritis has been often recorded; for example in 1937 Lowman was fully alive to it. Not the least claim in this article is made either to priority or originality, for this arthritis has been clearly recognised over many years. Reference also here may be made to sweating, which is not general but local, affecting the hands and feet, and to the occasional observation of sympathetic nervous changes both of which have been described in poliomyelitis. At this hospital the nursing staff have been so impressed with this local sweating that they speak of "wet" and "dry" cases.

CLINICAL FEATURES

Apparently about October, 1942, a number of cases of poliomyelitis arose in the wide area which this Bath hospital covers. Some were extremely severe, damaging both limbs and trunk muscles; others were mild, and possibly there were some so mild as to elude immediate observation; some came to hospital in the earliest stages, others late. It was among this group that a number of cases of arthritis were observed and it would appear that it was unusually common, though perhaps experience is necessary to be assured upon this; if it was unusually common, it recalls the variation in *the occurrence of rheumatic subcutaneous nodules in* "juvenile rheumatism."

Many joints were affected in these cases: the ankles, knees, hip-joints, elbows and wrists. As Barlow pointed out there was no redness, but heat over the joint was noticed in some examples. This arthritis might occur, as he also noted, with the acute onset or come on considerably later when the patient was under careful [illegible] were taken. In some cases the joints remained stubbornly swollen for weeks and months and not all made a complete recovery but underwent a fibrous ankylosis, and an ankle of a badly paralysed limb instead of being, as one would expect, flail-like, was fixed.

The onset of the arthritis was painful and in some young children so painful that they behaved like infants with [illegible] of movement. The [illegible] which a single hip-j [illegible] detected over the front of the joint, but pain and spasm of muscles are seen when there is no arthritis. In the more chronic cases the impression was given of a thickening of the capsules of su [illegible] than an excess of [illegible] owed little, but th [illegible] psule and a certain "fluffiness" of the inner surface of the synovial membrane. In the chronic, severe cases there were thickening of the capsule, diminution in the joint space, and [illegible] In no instance [illegible] ecovery was the [illegible] rthritis in cases [illegible] tle or no rise of [illegible] joint that gave the warning. Many years ago Barlow described what he termed "jump" cases of poliomyelitis, that is a renewed spread of paralysis after the first attack had died down. Such attacks are well recognised now, and the arthritis would seem to fall into line with these "jump" cases. As a general rule in this group of cases, the arthritis was more likely to develop in the cases of severe widespread paralysis than in the milder ones, but not always. Thus I was shown a little girl with only one lower limb not severely paralysed, whose right hip-joint was clearly swollen and extremely painful and the disease in the acute stage. It is easily understood how puzzling such cases must prove, and indeed it is always the unusual cases of a disease which cause confusion. Does the arthritis occur in an unparalysed limb? The answer is not easy to make, for it may be difficult, especially when there are scattered severe paralyses, to be absolutely sure that there may not be a slight paralysis in another limb. The answer however seems to be in the negative.

CAUSATION

In considering the cause of this arthritis various possibilities present themselves. Poliomyelitis is recognised as being *caused by a virus infection*, but many cases commence with a sore throat and fever, and the [illegible]

[illegible] and heart, no signs of suppuration or involvement of subcutaneous tissues, such as the nodules in "juvenile rheumatism," or enlarged lymphatic glands, as in tuberculosis. The late outbreaks of arthritis in a joint were in line with the "jump" paralysis described by Barlow.

Was this arthritis the direct result of the nervous destruction, including damage to the sympathetic system? Such a view recalls the suggestion of Coutts on Charcot's joints, and the arthritic changes in syringomyelia. The rare condition of intermittent hydarthrosis threw no light on the problem. No-one can doubt that profound nervous [illegible] uld cause a liability to a weak [illegible] a structure as a joint to any [illegible] cases at the hospital did not suggest a direct nervous cause, but rather its contribution to the likelihood of an arthritis. [illegible] the direct result of the virus i [illegible] vous damage? This question [illegible] ther human virus diseases may [illegible] has been recorded *in mumps and dengue fever, so that* poliomyelitis does not stand alone. The history of the arthritis resembles that of the poliomyelitis both in its appearance at the onset of the attack and the later exacerbations.

It is [illegible] myelitis into groups, such as [illegible] and so on, but it is of inter [illegible] al symptoms in the Bath ca [illegible] children would have outbursts of great irritability, even biting the nurses in such attacks; a number showed mental fatigue, and in rare cases there was an altered mental state which lasted for many months, eventually to recover. Such incidents were reminiscent of the much more severe conditions in encephalitis [illegible] en there was the local sw [illegible] re often met with in cho [illegible] These various symptoms s [illegible] by the virus in which the joints may be involved, possibly more often in one year than another. Some might suggest the arthritis is caused by lack of treatment, or by the use of plaster splints to keep paralysed limbs in correct position. The answer here is that it occurred in cases that had no treatment and in cases which had the most skilled treatment by rest and suitable [illegible] likely [illegible] vast n [illegible]

The m [illegible] be that the arthritis i [illegible] ction and an unusual p [illegible]

DIAGNOSIS AND TREATMENT

The practical importance of this arthritis in diagnosis seems clear. Writers on juvenile rheumatism include poliomyelitis as one of the pitfalls, and it is a setback to a doctor when he has called poliomyelitis *acute rheumatism* and later found a rapidly wasting limb. In my own experience it has been the pain which may occur in poliomyelitis that has been the reason for the mistake, and not the arthritis; but certainly the presence of a swollen joint would add to the likelihood of a mistake, particularly if the actual paralysis is not severe. Otherwise the rapid and scattered muscular wasting clinches the diagnosis. Extreme pain on movement is a feature of both diseases. There are other manifestations, cardiac in particular, which distinguish acute rheumatism, and the rapid rise of the sedimentation of the blood is very different to the slight change in poliomyelitis.

Tuberculous arthritis may be another pitfall and this particularly when the attack of paralysis is so slight as even to be overlooked and there is pain and swelling in a hip-joint. When this disappears and the child is found, owing to the slight paralysis of the affected limb, to limp, then tuberculous arthritis is likely to be suggested. Again it is found that while the blood sedimentation-rate alters little if at all in poliomyelitis, there is a sudden uprise at the commencement of a tuberculous arthritis. In addition the tuberculin tests are a warning, and if the paralyses are more spread and the muscular wasting more obvious the diagnosis of poliomyelitis will be the correct one. Very early X rays show no obvious difference in the two conditions, but later the destructive nature of tuberculous arthritis is apparent.

In some cases of *osteomyelitis* the joint is implicated, and again it is the unusual one of moderate but stubborn severity which may be puzzling. The altered sedimentation-rate, the absence of outstanding muscular paralyses and the picture in the X ray of the undermining of the cartilage of the joint are helpful, as also the absence of any outbreak of poliomyelitis in the district. Above all is the damage to the shaft of the limb.

Meningococcal arthritis is well known, and in a recent paper on cerebrospinal meningitis Copeman and Stewart (1942) suggested that the *Diplococcus rheumaticus* described by Paine and myself was in reality probably two different micrococci, one being the meningococcus the other the *Diplococcus rheumaticus*, and they also commented upon the nervous and muscular lesions in rheumatoid arthritis. The results of examination of the cerebrospinal fluid differ from those of poliomyelitis but these observations remind us of the complexities of the problems in human diseases, the more so when we recall encephalitis lethargica and the work of Schlesinger and his colleagues (1935), and Eagles and his colleagues (1937) on the virus theory of the origin of acute rheumatism.

The *treatment* resolves itself into keeping the affected joint at complete rest when the pain is thereby relieved. Occasionally a much swollen joint such as the ankle is assisted by careful strapping to add some gentle pressure. We are perhaps inclined sometimes, having thought that poliomyelitis is essentially a disorder of motor elements of the nervous system, to think the pain is not altogether real, but the occurrence of this arthritis warns us to be extremely careful in moving the child about for any active treatment lest we cause considerable distress.

CONCLUSION

The object of this paper is to point out that at least in some outbreaks of poliomyelitis, arthritis is comparatively common and this may not be generally recognised. This disease of virus origin and so destructive to the nervous system may possibly in the future help to throw light on rheumatoid arthritis and the nervous lesions in acute rheumatism, and is certainly of great interest and stimulating to our thoughts on many different diseases in which nervous lesions and arthritis may occur.

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STREPTOCOCCAL MENINGITIS TREATED WITH PENICILLIN

MEASUREMENT OF BACTERIOSTATIC POWER OF BLOOD AND CEREBROSPINAL FLUID

ALEXANDER FLEMING, F R C S, F R S
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(*Inoculation Department, St. Mary's Hospital, Paddington*)

THIS case was one of those recently reported by Florey and Florey.[1] It was then included (case 12) in a series with many others and therefore the notes had to be severely abridged. The case was the first in which intrathecal injection of penicillin was used, and the first in which the bacteriostatic power of the blood and spinal fluid was systematically titrated throughout the treatment, so that it seems worthy of a more complete record. More especially it seems important that the methods used for testing the bacteriostatic power of the blood and cerebrospinal fluid should be described, for there is as yet no chemical test for penicillin in blood as there is for the sulphonamides, and the only way of estimating the penicillin content of the blood is by bacteriostatic tests. More patients are now being treated with penicillin both here and in America, and it is very desirable that estimations of the bacteriostatic power of blood, &c. should be made so that the dosage of the drug can be scientifically controlled.

It may be that a favourable result in this case could have been obtained by intrathecal treatment only, but at that time penicillin had not been used in this manner, and there was no knowledge as to how it would be tolerated or for how long it would remain active in the spinal fluid. The observations made on this case have enabled other cases of meningitis to be treated successfully by local treatment with an enormous saving of penicillin—an important thing in these days of scarcity.

CLINICAL NOTES

Male, aged 52. Fever began June 18, 1942. No localising signs. Admitted to St. Mary's Hospital on July 7. Temp. 100·2° F. No satisfactory diagnosis could be made.

July 14. Developed signs indicating meningitis. Drowsy and wandering with slight neck-rigidity. Lumbar puncture performed; pressure 300 mm.; CSF 500 cells per c.mm. (mostly polynuclears); globulin and total protein increased; the fluid was unfortunately not examined bacteriologically until next morning, and any infection was obscured by the presence of large numbers of non-pathogenic gram-negative bacilli. Sulphapyridine (1 g. 4-hourly) was administered. Temperature became normal in 12 hours and remained normal during the course lasting 8 days. The patient, however, remained wandering and drowsy throughout.

18th. CSF was clear. Still some polynuclear cells. No organisms discovered.

21st. Sulphapyridine stopped, and on the next day temperature rose to 100° F.; pulse-rate 100 per min.; sick, wandering. Definite head-retraction. Kernig sign positive.

24th. 24 c.cm. of CSF removed: pressure 300 mm.; turbid; cells all polynuclears; no organisms seen or cultivated. At this time the patient was drowsy with occasional fits of extreme restlessness. There had been incontinence of fæces at intervals. A persistent hiccough developed which could not be controlled and the patient was obviously going downhill. Sulphathiazole was administered from July 24 to Aug. 6 without improving the patient's condition.

Aug. 1. Lumbar puncture: CSF turbid with polynuclear cells; cultures of centrifuged deposit showed no colonies, but 3 c.cm. of fluid shaken in 10 c.cm. of "sloppy" glucose agar (0 2%) gave 20 colonies of a non-hæmolytic streptococcus.

4th. Lumbar puncture: fluid as before. By the same method ("sloppy" glucose agar) 6 colonies per c.cm. of the same streptococcus were cultivated, although no growth could be seen on a blood-agar plate inoculated with the centrifuged deposit of 4 c.cm. of the CSF. On subculture from the glucose agar the streptococcus showed the following growth characteristics:

Blood agar.—Small flat regular colonies not altering the medium.

Boiled blood agar.—Very small colonies. Where the colonies were dense there was a slight greenish discoloration.

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[1] Florey, M. E. and Florey, H. W. *Lancet*, 1943, i, 387.

Agar.—Minute, transparent, round colonies.

Broth.—Faint, even turbidity.

Glucose broth.—Very dense even turbidity.

The cocci from broth and glucose broth cultures formed chains of up to 20 elements. The coccus was planted on blood agar containing gutters of sulphathiazole (1 in 5000) and penicillin (crude culture fluid). There was no inhibition of growth by sulphathiazole, but no growth occurred within 11 mm. of the penicillin, showing the organism to be resistant to sulphathiazole but sensitive to penicillin. The glucose broth culture was very acid, but when the pH was adjusted to 7 the culture formed a stable suspension suitable for agglutination tests. With the patient's serum agglutination was complete in a dilution of 1 in 80, and incomplete up to a dilution of 1 in 320, but none of the 12 normal serums tested gave any agglutination in dilutions of 1 in 10 or more. This confirmed the diagnosis that the streptococcus isolated on these two successive occasions was the infecting organism.

Aug. 5. Skull X-rayed for cerebral abscess with negative results.

Condition at the beginning of penicillin treatment.—On Aug. 6 we got in touch with Professor Florey who furnished a supply of penicillin for treatment. The patient was in a very bad state and appeared to be dying. He took little food; had been for days drowsy with occasional bouts of extreme restlessness; now drowsy, comatose, wandering and rambling; had been suffering from uncontrollable hiccough for 10 days; had been incontinent for a week, and on the night of Aug. 5/6 had to be stimulated with oxygen and coramine. On the evening of Aug. 6, two-hourly intramuscular injections of penicillin were begun. In 24 hours the patient was mentally clearer, the hiccough had disappeared and head-retraction was less marked. Temperature had fallen to 97° F.

Aug. 9. *Sudden rise of temperature to 102° F. Drowsy.* No sickness.

10th. T[illegible] …tally more rational.

11th. [illegible] 102° F.). Lumbar puncture [illegible] …id with polynuclear cells; no organisms.

12th. Temperature again normal. Lumbar puncture: 20 c.cm. CSF withdrawn and intrathecal injection of 5000 units of penicillin in 20 c.cm. of water given.

13th. Temperature 100·5° F. Mentally much more alert. Lumbar puncture: fluid withdrawn and intrathecal injection of penicillin repeated.

14th. Temperature normal. Lumbar puncture: fluid withdrawn and intrathecal injection of 2500 units of penicillin in 10 c.cm. of patient's serum given (with the object of providing opsonic substances which were lacking in the cerebrospinal fluid).

15th. Temperature normal. Lumbar puncture: fluid [illegible]

[illegible] injections discontinued from 8 PM to 8 AM.

16th–18th. Very alert and condition excellent. Intramuscular injections during the day only and discontinued on Aug. 18.

19th. Lumbar puncture: final intrathecal injection of 5000 units of penicillin in 20 c cm. of water.

28th. Temperature has been normal for two weeks. Patient getting [illegible] …ungitis. [illegible] …well. [illegible] …terwards). Patient has [illegible]

The dosage of penicillin, in thousands of units, was as follows:

Date: Aug.	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Intramuscular	30	120	120	190	240	180	160	105	90	100	90	90	90	
Intrathecal ..		..	.	.	..	..	5	5	2·5	5	..	..	..	5

Total. Intramuscular, 1,605,000;
intrathecal, 22,500 = 1,627,500 units.

BACTERIOSTATIC POWER OF BLOOD-SERUM

As it was undesirable to withdraw large amounts of blood daily from a very sick patient micro-methods were used. Staphylococci sparsely planted in human serum in capillary chambers such as slide cells or tubes grow out not as a diffuse growth but in well-defined colonies which can be easily recognised and counted. This happens not only when undiluted serum is used but also in dilutions of serum in normal saline up to over 1 in 100. Estimations of the bacteriostatic power of serum can therefore be made in serum diluted in saline, [illegible] a fluid [illegible] colonie[illegible] human [illegible]

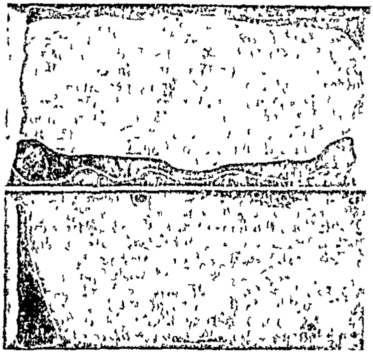

Fig 1.—Te[illegible] Growth of [illegible] Above, [illegible] olonies [illegible]

advantage over undiluted serum that it is a clearer fluid, and that the dilution eliminates any stray bacteriostatic substance which may be present in serum. The diluted serum is preferable to saline as a diluent, for in the serial dilutions the last volume can be left merely as diluting fluid, and if good colonies of staphylococcus develop in this and they do not appear in dilutions of the patient's serum then one is certain that the bacteriostasis is due to something in the patient's serum.

1. *Slide-cell method.*—Serial dilutions of serum (50 c mm. volume) were made, and these were mixed with 2·5 c.mm. of a suitable dilution of a 24-hour broth culture of staphylococcus (1 in 80,000) or streptococcus (1 in 5000). The mixtures were run into slide cells, sealed and incubated. The organisms grow into separate colonies which are easily counted (fig. 1). The amount of the inoculum of the test organism is important. The number of colonies which develop from 50 c.mm. of infected serum should be between 15 and 50. If less than 15 there might be a danger that through some error of technique so few would develop as to make it doubtful whether bacteriostasis has occurred, while if large numbers are present the colonies are crowded and small, rendering it difficult to see in which dilution the colonies have failed to develop.

The serial dilutions may be done on a simple two-fold scale by putting out a series of 50 c.mm. volumes of the diluent on a paraffined slide, then mixing 50 c mm. of the serum to be tested with the first volume, carrying over 50 c.mm. to the second volume and mixing it, and so on, till as many dilutions as are required have been made. If it is desired to work more closely, 50 c mm. volumes of the diluent are placed on the paraffined slide as before, then 100 c.mm. of the test serum is mixed with the first volume, 100 c.mm. of this is mixed with the second volume, and so on. This gives (assuming undiluted serum is also used) dilutions of 1/1, 2/3, 4/9, 8/27, 16/81, &c.

There is no difficulty in mea[illegible]

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2. It is easy to prepare calibrated capillary pipettes measuring from 2·5 c.mm. to 100 c mm by the aid of the "automatic pipette" described by A E Wright and L. Colebrook in their *Technique of the Teat and Capillary Glass Tube*, London, 1921 (quoted in the MRC *System of Bacteriology*, vol. IX, p 178).

fluid adhering to it. This is readily done by heating the pipette by passing it through the bunsen flame (this is necessary to sterilise the pipette), and rolling the distal half-inch on a slide covered with a thin layer of paraffin wax.

2. *Capillary culture method.*—This is simpler than the above as it does not necessitate the preparation of slide cells, but the results are not quite so easily read. A 25 c.mm. volume of diluted serum is mixed with 2·5 c.mm. of culture diluted as above and the mixtures are run into capillary tubes so that the column of fluid occupies about 2 inches of the tube. The capillary is then sealed and incubated horizontally, stuck in position in "Plasticine" on a microscope slide. The organisms grow out into separate colonies. Observations by this method were made daily with results shown in table I.

3. *Using blood infected with hæmolytic streptococci as the indicator of bacteriostasis.*—This method was not used in this particular case, but I have used it in connexion with sulphonamides[3] and more recently in penicillin therapy with success. It is the most dramatic method of demonstrating the bacteriostatic power of the patient's serum, and it obviates the use of such small volumes as 2·5 c.mm., which many workers may find difficult to estimate with accuracy. *Strep. pyogenes* grows in human defibrinated blood in slide cells, and around each colony is a very definite area of hæmolysis. If many colonies are present and sufficient time is allowed the blood is completely hæmolysed.

Serial dilutions (25 c.mm.) of the patient's serum are made in normal saline, and to each of these is added an equal volume of human blood infected with hæmolytic streptococci. If it is a case which is being treated with sulphonamides it is necessary to be very careful not to use too large an inoculum (a suitable implant is 0·1 c.cm. of a 1 in 1000 dilution of a 24-hour broth culture to 1 c.cm. of blood), but when dealing with penicillin patients the amount of the inoculum within wide limits makes little difference to the result, and I have found it convenient to use a loopful of a 24-hour broth culture in 1 c.cm. of blood. Normally human blood has a considerable bactericidal power for these cocci, due to the presence of leucocytes, so to avoid any confusion and to give an accurate estimation of the bacteriostatic power of penicillin in the patient's serum the blood should, before infection with streptococci, have its leucocytes removed or destroyed. This can be done in various ways—

(*a*) By deleucocyting.[4]

TABLE I—BACTERIOSTATIC POWER OF BLOOD-SERUM

Date Aug.	Penicillin dosage in thousands of Oxford units every 2 hr. before blood taken	Hours after injection when blood taken	Bacteriostatic power of serum Growth in dilutions of serum as under infected with—								
			Staphylococcus					Streptococcus (patient's)			
			1/1	1/2	1/4	1/8	1/16	1/1	1/2	1/4	1/8
6	0	..	+	+	+	+	+	+	+	+	+
7	10	2	0	0	±	+	+	0	+	+	+
8	10	2	0	0	±	+	+	0	+	+	+
9	10	2	0	±	+	+	+	0	+	+	+
10	20	2	0	0	0	0	+	0	0	0	+
11	15	2	0	0	0	±	+	0	+	+	+
12	15	1*	0	0	0	0	+	0	0	0	+
13	10	2	0	±	+	+	+	±	+	+	+
14	7·5	2	0	±	+	+	+	0	+	+	+
15	7·5	½*	0	0	+	+	+	0	+	+	+
16	10	2*	0	0	+	+	+	+	+	+	+
17	10	⅓*	0	0	0	±	+	0	0	±	+
18	10	2	0	±	+	+	+	+	+	+	+
19	.	18	+	+	+	+	+	+	+	+	+
20	..	48	+	+	+	+	+	+	+	+	+

* Note increased bacteriostatic power when serum tested at shorter interval.
0 = No colonies. ± = Colonies smaller and fewer.
+ = Colonies as large and as numerous as in the control normal serum.

(*b*) By heating to 50° C. for 30 min.

(*c*) By adding liquoid to make a concentration of 1 in 1000. This is convenient as it prevents the blood clotting and renders defibrination unnecessary.

(*d*) By the use of blood which has been collected for more than 2 days, when most of the leucocytes have perished. The infected blood-serum mixtures are placed in slide cells, sealed and incubated. Where there is no bacteriostasis the streptococci cause areas of hæmolysis, but when the streptococci are prevented from growing no hæmolysis occurs. (These mixtures can be incubated in capillary tubes but the results are not so striking.) Fig. 2 gives a typical result.

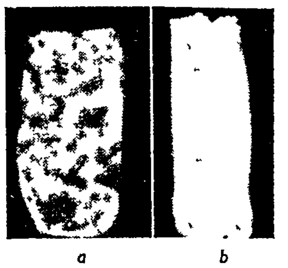

Fig. 2—Testing bacteriostatic power of patient's serum using *Strep. pyogenes* in blood as indicator. Serum (*a*) before and (*b*) after penicillin treatment. Dark spaces represent areas of hæmolysis due to streptococcal growth.

A permanent record of slide cells prepared in this way can easily be made. The series of cells are placed on a piece of bromide paper in the dark-room, and an accurate print is made by exposing them for 1 or 2 seconds to the light of an ordinary electric lamp placed 3 feet or so above the paper; or the slide cells may be placed in an enlarger and sharply focused enlargements may be made. These recording methods are so easy that if a dark-room is close to the laboratory it is almost quicker to make a print and incorporate it in the notes than it is to write up a description of the results.

This is probably the most convenient and convincing method of demonstrating the bacteriostatic power not only of serum but also of cerebrospinal fluid, or of any other body fluid.

By these methods the following observations were made:

(*a*) That the patient's streptococcus was only about half as susceptible to the bacteriostatic power of the penicillin-treated patient's serum as was the test staphylococcus. It had previously been determined that this was the ratio of sensitivity when cultures of these two organisms were tested to penicillin by the impregnated strip method on a blood-agar plate.

(*b*) That the patient's serum, which had no bacteriostatic power before penicillin was administered, promptly became bacteriostatic and maintained this power throughout the course of treatment.

(*c*) Normally the blood was collected 2 hours after an intramuscular injection (immediately before the next one), but on three occasions the blood was collected after a shorter interval and on all these occasions the bacteriostatic power of the serum was appreciably higher. The blood should be tested within a few hours of its withdrawal or, if the examination has to be postponed till next day, it must be stored in the refrigerator. If kept for 24 hours at room temperature the small amount of penicillin contained in the blood-serum may lose part or all of its activity.

CEREBROSPINAL FLUID

When first examined, the cerebrospinal fluid was almost clear, but it later became definitely turbid from the presence of polynuclear cells. On several occasions no organisms could be discovered, but eventually by the use of "sloppy" glucose agar small numbers (about 6 per c.cm.) were found on two successive occasions. No organisms could be recovered on any occasion after the beginning of penicillin treatment.

After penicillin treatment had begun each specimen of CSF was examined in regard to its bacteriostatic power to staphylococcus and the patient's streptococcus. Tests were made by the same methods which were used for the blood-serum, but as CSF is a poor culture medium for staphylococci it was necessary to use normal serum (or diluted normal serum) as a diluent. The results obtained are set out in table II.

When the CSF contains considerable amounts of penicillin after intrathecal injection, estimations of the bacteriostatic power can be made by simple titrations in infected broth (using 0·5 or 1·0 c.cm. quantities), just as is done in the original titrations of penicillin.

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3. Fleming, A. *Lancet*, 1938, ii, 564.
4. Fleming, A. *Brit. J. exp. Path.* 1926, 7, 281.

TABLE II—RESULTS OF EXAMINATION OF CEREBROSPINAL FLUID

Date Aug.	Turbidity	Colour	Protein content (mg /c.cm)	Conc. of CSF inhibiting growth		Conc. of blood-serum inhibiting growth (for comparison)	
				Staph	Strep.	Staph.	Strep.
11	+	Nil	...	1 in 2	2 in 3	1 in 4	1 in 1
12*	+	Nil	110	1 in 2	6 in 7	1 in 8	1 in 4
13*	+++	Yellow	160	1 in 40	1 in 20	1 in 2	1 in 1
14*	++	Yellow	130	1 in 160	1 in 40	1 in 2	1 in 1
15*	++	Yellow	240	1 in 40	1 in 40	1 in 2	1 in 1
19	Trace	Nil	70	No inhibition in 67% CSF		No inhibition in undiluted serum	

* Intrathecal injections of penicillin.

The bacteriostatic power of the CSF was also tested by the "agar cup" method, in blood-agar plates, with the following results:

Date	Distance of inhibition from edge of cup (mm.)	
	Staph.	Strep.
Aug. 12	0	0
„ 13	13	4
„ 14	14	6 5
„ 15	11	2 5
„ 19	0	0

The bacteriostatic power of the CSF withdrawn on Aug. 14 (which had been found to have the highest value) was compared with that of sulphathiazole (1 in 5000) by the "impregnated strip" and agar cup methods, with the following results:

Method	Organism	Distance of inhibition from drug (mm.)	
		CSF	Sulphathiazole 1 in 5000
Impregnated strip	Strep.	11	0
Agar cup	Staph.	15	5

COMMENTS

Diagnosis.—When the patient was admitted there were no signs or symptoms pointing to meningitis. As soon as any localising signs were observed the state of the CSF indicated a meningitis, but the infecting organism could not be seen in the fluid nor was it cultivated until a special method—"sloppy" glucose agar—was used. Even then it appeared to be present in very small numbers, about 6 per c.cm. The infecting streptococcus was of an unusual non-hæmolytic type, but that it was the actual infection was shown by the fact that, apart from its being isolated in pure culture on two successive occasions, it was strongly agglutinated by the patient's serum but by none of the normal serums tested.

Clinical effect of sulphonamides.—The first course of sulphapyridine brought the temperature down to normal, but as soon as it was stopped the fever returned, and a subsequent course of sulphathiazole had no effect. When the streptococcus was isolated it was completely resistant to sulphathiazole. It may be that [illegible] rtially sensi- [illegible] was to some [illegible] and then it [illegible] subsequent [illegible] effect. This, [illegible] s not isolated [illegible] inistered for some days.

Effect of penicillin.—When intramuscular injections of penicillin were commenced the patient appeared to be dying. Within 24 hours there was a definite improvement—temperature dropped, hiccough ceased, and he was mentally more alert. There were two rises of temperature after 3 and 5 days, and as the bacteriostatic power of the CSF had not risen as high as that of the blood an intrathecal injection of penicillin was given (5000 units in 20 c.cm. of water). This gave no clinical reaction although there was evidence of some slight irritation by an increased emigration of polynuclear leucocytes. The intrathecal injection was repeated on 3 successive days, and then half the dose was given intrathecally dissolved in the patient's serum to provide opsonic substances which were lacking in the CSF (as they are normally). Whether this last combination was better than mere solution in water it is impossible to say, but theoretically, since penicillin is essentially bacteriostatic so that the cocci have to be killed by the natural defences, it seemed reasonable to provide opsonic substances so that the polynuclear cells which were abundant in the fluid should be able to ingest and destroy the cocci.

The intramuscular injections caused little or no local reaction, but as they were given every 2 hours day and night for 9 days the patient ultimately complained of tiredness from lack of sleep. The injections were then continued 2-hourly for 3 days during the day only and the patient was allowed to have a night's sleep undisturbed. It is likely that the treatment was continued too long, but as there was no satisfactory means of checking this it was considered wise to err on the safe side.

Bacteriostatic power of blood during penicillin treatment.—Throughout treatment a two-fold dilution of the patient's serum completely inhibited the growth of staphylococcus (except on a few occasions). The highest figure obtained (when the blood was taken immediately *before* an injection of penicillin) was complete inhibition of staphylococcus by an eight-fold dilution of serum. As regards the patient's infecting streptococcus, there was complete bacteriostasis by undiluted serum except on one or two occasions, and on one occasion a four-fold dilution of the serum completely inhibited growth.

It is p[illegible] to render t[illegible] by 2-hourly [illegible]

If the undiluted serum is completely bacteriostatic dosage is probably sufficient, but if the bacteriostatic power of the serum can be increased so that a two-fold dilution or more is bacteriostatic it is an obvious advantage.

Bacteriostatic power of CSF.—Before the intrathecal injection of penicillin the bacteriostatic power of the CSF was less than that of the blood-serum, indicating *that penicillin did not pass freely from the blood to the* fluid. F[illegible] on three [illegible] power, t[illegible] of staphylococci in a 1 in 100 dilution of the fluid (blood-serum taken at the sa[illegible] terio-stasis only in a 1 in 2 [illegible] that there was not a free [illegible] ween the CSF and the blood. The yellow colour of the impure penicillin injected was also very obvious in these specimens (as it was in the blood-serum to a lesser degree while intramuscular injections were being given). The last specimen of CSF, which was taken 4 days after an intrathecal injection of penicillin, had no yellow colour and no bacteriostatic power, so it is evident that the bacteriostatic power disappears at some period between 24 hours and 4 days.

Effect on the elements of the blood.—There was no change in the blood-urea or hæmoglobin content. Throughout the illness there was a polynuclear leucocytosis of about 15,000 per c.mm. As recovery progressed the leucocyte count fell to normal and remained there. There was therefore no indication that penicillin affected the kidneys or the blood-forming mechanism.

SUMMARY

A man of 52 who was apparently dying of a streptococcal meningitis made a complete recovery after intramuscular treatment with penicillin for 11 days and 4 concurrent intrathecal injections of the drug.

The patient had already received courses of sulphapyridine and sulphathiazole, and the organism had become sulphonamide-fast.

For one intrathecal injection the penicillin was dissolved in the patient's serum, to provide opsonic substances.

Neither the intrathecal nor the intramuscular injections caused any significant local or general reaction.

The bacteriostatic powers of the blood and cerebrospinal fluid were followed throughout penicillin treatment.

My thanks are due to Professor Florey for the supply of penicillin, and for his advice as to administration and dosage, to Dr. T. A. Kemp and Dr. Duncan Gregg for their assistance, and to Sister Downer whose unremitting care contributed materially to the satisfactory result.

MECHANICS OF HEAD INJURIES

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THE assumption that there is a mechanics of head injuries implies that, when the head receives a blow, the behaviour of the skull and brain during and immediately after the blow is determined by the physical properties of skull and brain and by Newton's laws of motion. The most important physical properties of brain are:—

(*a*) Its comparatively uniform density. Nerve tissue, blood, and cerebrospinal fluid all have about the same density as water.

(*b*) Its extreme incompressibility. Brain substance does not appreciably change its size when subjected to a pressure which is uniform in all directions (a so-called hydrostatic pressure), and the incompressibility is about the same as that of water—it would take, for example, a force of about 10,000 tons to compress the brain to half its volume.

(*c*) Its very small modulus of rigidity. That is to say, brain offers a very small resistance to changes in shape compared with the resistance it offers to changes in size. For example, every surgeon knows that it takes only a small force on a retractor to produce quite a large deformation of the brain—nothing remotely comparable with 10,000 tons.

(*d*) Compared with the feeble rigidity of the brain the rigidity of the skull is very great. For example, it takes about 1 ton to reduce the diameter of the skull by 1 cm.

(*e*) The shape of the skull and brain are important in deciding the location of injuries.

(*f*) It is reasonable to suppose that the brain behaves like the substances whose properties have so far been studied, and therefore that it is injured when its constituent particles are pulled so far apart that they do not join up again properly when the blow is over. In the case of a substance such as brain, whose modulus of incompressibility (bulk modulus) is large compared with its modulus of rigidity, the amount of pulling apart of the constituent particles is proportional to the shear-strain. (Shear-strain, or slide, is the type of deformation which occurs in a pack of cards, when it is deformed from a neat rectangular pile into an oblique-angled pile.) Hence the shear-strain present at any point in the brain should be at any rate a rough measure of the probability of injury at that point. In other words, shear-strains are the cause of injury, whereas compression and rarefaction strains are not. This is in conformity with the known results for peripheral nerve. Thus, Grundfest[1] found that nerves continued to conduct when subjected to a compression strain due to a pure hydrostatic pressure of 10,000 lb. per sq. in. Of course, this hydrostatic pressure is vastly greater than anything which can arise in a head injury. If, however, the pressure is not a purely hydrostatic one—if it is different in different directions—it must involve some shear, and a very small pressure of this type may be sufficient to injure a nerve. The injuries to nerves produced by crushing with forceps or by stretching are examples of the effects of shear. Even when a nerve is squeezed with a pressure-cuff, the pressures are not equal at all places and in all directions, and therefore there are shear-stresses. It is undoubtedly these shear-stresses, and not the hydrostatic pressure, which produce the effects on the nerve.

On the basis of the five properties (*a–e*) of the skull-brain system, one can predict the distribution of shear-strains, and therefore the locations of injuries, resulting from various types of blow. The mathematical theory falls naturally into two halves: (1) injury to the ain occurring as a result of distortion of the skull; and (2) injury to the brain occurring whether or not the skull is distorted.

LOCALISED INJURY DUE TO SKULL DISTORTION

As one would expect, distortion of the skull is most severe near the point of application of the blow. It consists mainly of an indentation of the skull. If fracture of the skull does not occur, the shear-strains in the brain are mainly confined to a superficial region close to the dent; hence the injury to the brain consists mainly of a superficial bruising near the point of application of the blow. Waves of compression and rarefaction (sound waves) emanate from this region and travel back and forth through the brain, but since, as explained in (*f*), it is only shears which are injurious, these sound waves do not cause any damage.

If the skull fractures, then shear-strains are produced in the brain in the immediate neighbourhood of the fracture, so that the injury is comparatively superficial in this case also. A fracture in the skull is the most probable cause of tearing of the dura, particularly where it is strongly adherent, as in the very young and very old. When hæmorrhage from a large vessel does take place, its most probable location is where a fracture line crosses the vessel, because the shears are largest near the fracture. In this way, extradural, subdural and subarachnoid hæmorrhages can occur. The shears which arise as a result of skull distortion without fracture are much smaller and therefore probably hardly ever cause hæmorrhages from large vessels. Subdural and subarachnoid hæmorrhages from large vessels may also result from the second mechanism of injury, which will now be considered.

INJURY DUE TO ROTATION

As well as the strains which arise in the brain as a consequence of cranial bending there are others which could arise even if the skull were absolutely undeformable. These are called into play by the change in the velocity of the head caused by the blow. The most general type of change in velocity which a blow can produce can be analysed into a change in the straight-line, or linear, velocity together with a change in the rotational velocity about some axis. Hence the forces which the most general type of change in velocity can produce can be analysed into the linear acceleration forces due to the change in linear velocity, and centrifugal forces, coriolis forces and rotational acceleration forces, due to the change in rotational velocity. The linear acceleration forces tend to produce compressional or rarefactional strains which, from (*f*), have no injurious effect. The shear-strains, which are also produced by the linear acceleration, are small. They are produced mainly in the neighbourhood of foramina where tissue has a tendency to be extruded or sucked in, and in the neighbourhood of ventricles owing to the slight difference in density between CSF and brain tissue. These shear-strains produced by the linear acceleration forces are small compared with those accompanying the change in rotational velocity, and may therefore be neglected, at any rate as a first approximation.

Blood as well as tissue can be sucked in or pressed out through foramina as a result of either the linear acceleration or the skull bending, but owing to the viscosity and inertia of the blood the amount involved is small. In addition the effect only lasts during the blow. Hence, it can be neglected, at any rate as a first approximation. In any case it can never be the cause of, say, small capillary hæmorrhages in regions remote from foramina.

That no appreciable relative movement takes place between the constituent parts of the brain as a result of the linear acceleration may readily be verified by anyone who cares to fill a narrow-necked flask with water, and to add a little shredded cotton-wool in order to render visible any movement of the water. A purely linear change in the velocity of the flask produces no visible effect in the water—it moves bodily with the flask. Water has no rigidity, so that very small forces tending to produce deformations in the water would readily be detected if they existed. The idea that the brain is loose inside the skull, and that when the head is struck it rattles about like a die in a box, thereby causing coup and contrecoup injuries, is erroneous.

The centrifugal and coriolis forces called into play by the rotation can also be neglected, because they are

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undfest, H. Cold Harbor Symposia on Quantitative Biology, 1936, vol. IV, p. 179.

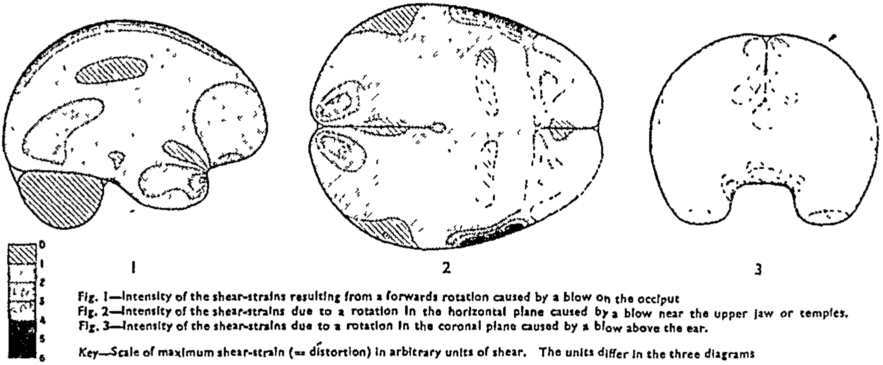

Fig. 1—Intensity of the shear-strains resulting from a forwards rotation caused by a blow on the occiput
Fig. 2—Intensity of the shear-strains due to a rotation in the horizontal plane caused by a blow near the upper jaw or temples.
Fig. 3—Intensity of the shear-strains due to a rotation in the coronal plane caused by a blow above the ear.

Key—Scale of maximum shear-strain (= distortion) in arbitrary units of shear. The units differ in the three diagrams

small, and not of a type very liable to cause injury. Usually the rotational acceleration forces are the main cause of brain injury. That the change in the rotational velocity of the head is likely to cause injury may easily be seen by giving a sudden rotation to the flask full of water mentioned previously. The water tends to stay behind, and only the flask rotates. Hence, as a result *of the rotation a particle of water attached to the inside* surface of the flask [illegible] ing particle not th[illegible] produced. Water [illegible] brain, so that this model exaggerates the effect of shearing stresses.

Fig. 1 is a parasagittal section of the brain passing through the tip of the temporal lobe. The shear-strains shown in it are those which are produced by a rotation such as might be caused by a blow on the occiput. The figure was obtained by making a model of this cross-section of the brain out of 5% gelatin, with ½% formalin added as a preservative. The gelatin was cast into the paraffin-wax "skull," and then cut free with a taut wire. After this, the model was allowed to stand until slight adhesions grew across the water-filled gap between "brain" and "skull." By this means there was obtained a shear-strain distribution which was intermediate between that for the "brain" completely free from the "skull" and that for the "brain" firmly attached to the "skull." The gelatin adhesions had a rough mathematical correspondence with the attachments between the pia and the somewhat less extensible arachnoid. When the model, placed in a circular polariscope, was given a sudden forwards rotation, the shear-strains in the gelatin became visible owing to the colours they produced in the field of view (Coker and Filon).[2]

The strains could [illegible] method of relaxatio[illegible] merely as an elegan[illegible] in a system with th[illegible] merely for convenience. Exactly the same shear-strains would ar[illegible] or metal. Even in the case [illegible] aggregate of crystals of differe[illegible] and elasticities, the shear-strains, averaged over regions large compared with the size of the crystals, are exactly the same as in gelatin. But the average shear-strain in a particular region of an alloy gives no clue as to what exactly [illegible]

[illegible] of blood-vessels, tearing of axons, disrupting of cell bodies, tearing apart of synapses, or injuring of some parts of the nerves by amounts insufficient to cause actual breakage.

The most prominent features of fig. 1 are the large amount of shear-strain in the anterior part of the temporal lobe, and the comparative absence of shear-strain in the cerebellum. The main reason for the large amount of shear-strain at the tip of the temporal [illegible] the brain mainly by means of the force it exerts on this portion of the brain. Hence this is where most of the strains appear. Elsewhere the brain tends to slip somewhat relative to the skull, so that smaller strains are produced. The relative slip between brain and skull is greatest near the vertex, which is far removed from any place where the skull can get a grip on the brain to turn it round. Hence the brain tends to get left behind in this region and it therefore rubs against the skull more than in other places. The superficial region of strain in the vertex is due to the effect of friction and connexions between skull and brain. This allows the skull to get a small amount of grip on the brain. In the case we are considering, of a blow on the occiput, this region of superficial shear-strain due to rubbing would extend to the falx, against which the brain would rub in the same way as against the vertex of the skull. The comparative absence of strain in the lateral cerebellar lobe is due mainly to its small size—it does not require such large forces to make it rotate as are required to make the cerebrum rotate. It should be noted that there is hardly any part of the brain which is completely free from strain.

What evidence there is from autopsies in the case of blows on the occiput confirms a distribution of hæmorrhages [illegible] of highest strain [illegible] Courville).[3] *It is, of* [illegible] damaged in regions [illegible] to cause hæmorrhage.

That shear-strains correspond to damage in the case of a jelly is shown by fig. 4, which is a photograph of the model taken after it had been subjected to a more violent rotational jerking. Note that besides the region of extreme fragmentation in the temporal and frontal lobes there is a superficial layer near the vertex. The slight damage in the lateral sinus and occipital pole is an artefact. The appearance of the jelly is remarkably similar to the post-mortem appearance of a brain after an extremely severe occipital injury.

Figs. 2 and 3 are shear-strain diagrams for typical *horizontal and coronal sections rotated in their own* planes. Fig. 2 shows the effect of a rotation which would be most easily produced in real life by a sideways blow in the neighbourhood of the upper jaw. It would also be produced to some extent by a sideways blow on the temples. The rotation in fig. 3 corresponds to that which is most easily produced by a blow above the ear. Both these sections are somewhat more unsatisfactory than the previous one because the effect, on the section considered, of strains in neighbouring sections is more marked than before. In addition, both these sections should really have sections of ventricle included in them. This would disturb the strain system somewhat; and there would be a tendency for the strains to congregate near the ventricular walls. An unsatisfactory feature of fig. 3 is that the cavernous sinus is really more yielding than bone, whereas in the model it is just as unyielding. In spite of these defects, however, figs. 2 and 3 do correspond reasonably well to the injuries caused by temporal and high parietal blows respectively. The main discrepancy between these figures and the post-mortem findings is that, by all accounts, the superficial injury at the sides of the temporal lobes shown in fig. 2 appears to be found at one side only—usually, though not invariably, the opposite side to the side of the blow (Courville[3]). It must be remembered, however, that these two figures refer only to those unusual cases in which the rotations are exactly in the planes of the sections. It will be just as unusual therefore to find exactly symmetrical damage of this type as it is to find exactly symmetrical damage due to a blow on the occiput. There are other less obvious factors making for asymmetry.

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[2] Coker, E. G. and Filon, L. N. G. Treatise on Photoelasticity, Cambridge, 1931.

[3] Courville, C. B. *Arch. Surg.* 1942, 45, 19.

As the brain is so incompressible, it will be impossible for any empty spaces to be formed anywhere as a result of the blow. Hence, since no spaces can be formed between the skull and brain, the surface of the brain can never move away from the interior skull surface: it can therefore only slide along it. Since the dura is comparatively firmly attached to the skull, the motion of the dura relative to the skull will usually be negligible. Hence the main motion must be the sliding of the pia relative to the arachnoid and of the arachnoid relative to the dura—the latter being presumably greater. In this process the vessels which drain the cortical veins into the venous sinuses will be stretched, and may break anywhere along their length, causing subdural or subarachnoid hæmorrhages. For a rotation in the plane of fig. 1, the relative sliding motion is greatest near the vertex, since it is furthest removed from any place where the skull or dural processes are so shaped as to get a good grip on the brain. Hence this is the most probable region for hæmorrhages of this type. For rotations in the planes of figs. 2 and 3 the sliding is greatest at the sides of the convexities, but there are no communicating veins in this position. For all directions of rotation the sliding is minimal in the neighbourhood of the base, so that the cranial nerves, arteries and veins of the base usually escape rotational damage. When the pia moves relative to the arachnoid, the tethering trabeculæ and perforating vessels may be torn. This type of injury is most likely to occur near the vertex for rotations in the plane of fig. 1, and at the sides for rotations in the planes of either figs. 2 or 3.

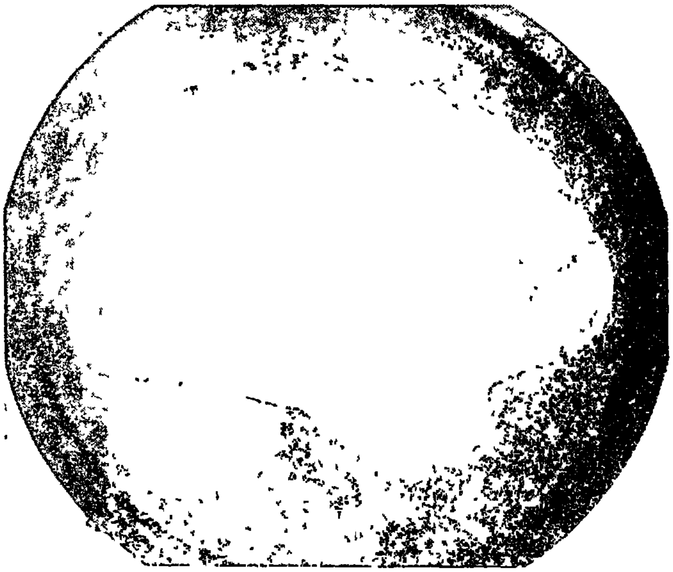

Fig. 4—Effect on a jelly of a violent rotational jerking in its own plane.

If the gelatin model were given a purely linear change velocity, no shear-strains would be visible, because, as previously mentioned, a change in linear velocity tends to produce compression and rarefaction only. Hence, for a system with the properties (*a–c*) the theory of contrecoup is without physical foundation. The so-called contrecoup injuries are really rotational injuries.

The distribution of shear-strain in a real brain depends to some extent on factors which are not accurately known. Hence there may be considerable deviations from the distribution shown in figs. 1, 2 and 3. These figures do, however, give good grounds for believing that head injury is primarily a problem in pure physics, and consequently that rotations are of paramount importance. The results which follow, being dependent only on the neglect of all the effects of the blow except the rotation, are more certain.

If there is no rotation or only a very small or slow one, there is no rotational injury. Thus, if the head is so well fixed that it cannot rotate at all when it receives a blow, there will be no rotational injury. Denny-Brown and Ritchie Russell[4] found that it was very difficult to produce concussion in cats when the head was fixed, but easy when it was free to move. This points to the fact that concussion is a rotational injury. One would certainly expect it to be so because skull-distortion injury is localised, and because much greater local injury to the cerebral hemispheres can be produced at operation without loss of consciousness. As is shown in figs. 1, 2 and 3, rotational shear-strains are present throughout the whole brain in greater or lesser degree, and are therefore much more likely to be the cause of a phenomenon such as unconsciousness. Up to the present, technical difficulties have prevented any estimation of the shear-strains in the brain stem. When a person's head is crushed between the slowly moving buffers of two railway trucks in a shunting accident, only a slow rotation can be produced; and in such accidents there is usually no concussion.

The momentum of a rifle bullet is surprisingly small, and therefore the rotational velocity it can produce is small. If a 10 g. bullet travelling at 400 metres per sec. is completely stopped by the head, the rotational velocity produced is about the same as that produced when one walks into a wall at 2 miles per hour. It is well known that wounds from low-velocity bullets often do not produce concussion. A bullet, owing to its small mass, is an example of an object having a large kinetic energy and at the same time a small momentum. It is owing to this that in low-velocity gunshot wounds the plainly visible injury to scalp, skull and brain in the path of the bullet (which depends mainly on the kinetic energy) is much larger than the invisible damage due to rotation (which depends mainly on the momentum). On the other hand, when the head hits a wall or a pavement, the masses involved are large so that the kinetic energies are small and the momenta large. Hence the plainly visible injury is in this case small compared with the invisible damage due to rotation. Now objects which are generally found in motion—bullets, balls, bricks, &c. —are usually less massive than the stationary objects which one's head is likely to hit. Hence collisions with stationary objects will usually produce more rotational damage than one would expect from the external injury. This is no doubt why it is often said that it makes a difference whether the head or the object causing the injury is in motion—a statement which, taken at its face value, is clearly absurd. For certain directions of blow at certain points of the head—notably points on the midline—a blow, however hard, produces no rotation. In association football, the direction of the ball and the point of the head at which it is "headed" are related in such a way that little rotation is produced by the impact. As an example of the opposite effect, one of the easiest ways of producing a rapid rotation of the head is to strike the chin sideways and upwards. This is the favourite knock-out blow in boxing.

For blows of long duration, the shear-strains in the brain are proportional to the force (assuming that the direction and point of application remain constant). That is to say, the injury is independent of the time for which the force acts. Hence one might say, from Newton's second law, that the injury is proportional to the acceleration, or rate of change of velocity of the head. On the other hand, for very short blows the injury is

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4. Denny-Brown, D., and Russell, W. R. *Brain*, 1941, 64, 93.

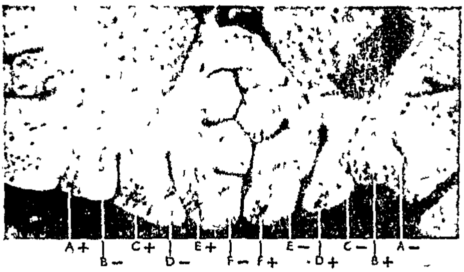

Fig 5—Section showing large-scale symmetry combined with positive-negative symmetry in the details.

proportional to the force multiplied by the time for which it acts. Hence, from Newton's second law, the injury is proportional to the change of velocity of the head and not to the rate of change—i.e., acceleration. For this reason, the term "acceleration concussion" may well prove misleading. The change-over from one law of injury to the other occurs gradually somewhere in the region between 1/5 and 1/500 sec. Experiments are in progress to find a more accurate value for the critical duration of the blow. The change-over from one law of injury to the other is accompanied by a change in the distribution of the shear-strains. Figs. 1, 2 and 3 refer to forces of long duration.

Using the fact that the change in linear velocity produces no effect, and using the theorem in kinematics that any rotation about any axis is equivalent to an equal rotation about any other axis together with a translation, we have the result that equal rotations about all parallel axes produce exactly the same injury. For example, it makes no difference whether the rotation takes place about an axis through the centre of the brain or about a parallel one through a point in the neck.

Figs. 2 and 3 show sections of the brain in which the right-hand side is the mirror-image of the left-hand side. The strains on the right-hand side are also the mirror-image of the strains on the left-hand side. This sym- [illegible] holds for rotations about any axis [illegible] plane. But this result only holds [illegible] ase of simple substances such as [illegible] nces such as brain, in which the [illegible]

[illegible] accurate statement of the facts in the case of rotations about any axis in the median plane is as follows: the large-scale injury on one side of a symmetrical section of the brain is *approximately* the *mirror-image* of the large-scale injury on the other side, but the minor details need not be mirror-images—for example, they may in exceptional circumstances be as it were negatives on one side and positives on the other. Fig. 5 shows *the predicted effect.* The injured gyri on one side correspond to the injured gyri on the other, but in each individual gyrus an injured portion on one side is the mirror-image of an uninjured portion on the other.

In the case of symmetrical sections, we can at once see that whether the rotation consists of a bending to the [illegible]ght or a bending in the opposite direction, the large-[illegible]cale injury, being symmetrical, will be approximately the same in either case. But it can be shown that this result is not confined to [illegible]. For example, theory shows [illegible] produced by the rotation [illegible] struck centrally on the o[illegible] same as that produced by [illegible] occurs when the head is struck centrally on the forehead (fig. 1 refers in fact to either blow). The details may, however, be different. In this connexion a remark by Courville is interesting: "Essentially identical lesions of the subfrontal and anterior temporal regions result from contact of either the frontal region or the occipital region of the moving head."

SUMMARY

The theory of head injury is developed on the assumption that, during and immediately after the blow, all factors other than the purely physical can be neglected.

On this assumption there are two main causes of injury: (1) deformation of the skull with or without fracture; and (2) sudden rotation of the head which is responsible for the so-called contrecoup injuries, for some intracranial hæmorrhages and probably for concussion.

The agreement between the theoretical predictions and the observed facts is good, considering the number of data which are only imperfectly known. Hence one can be reasonably confident that only minor modifications to the theory will be necessary to explain quantitatively the usual type of accident.

It is impossible to thank all those who have been helpful. This research would not have succeeded without the help of, among others, Prof. Hugh Cairns, Major W. Ritchie Russell, Dr. Dorothy S. Russell, Mr. G. F. Rowbotham, Dr. A. H. T. Robb-Smith and Dr. David Whitteridge, together with the facilities of the Oxford University Laboratory of Physiology placed at my disposal by Prof. E. G. T. Liddell.

EFFECTS OF DRINKING SMALL QUANTITIES OF SEA-WATER

AN EXPERIMENTAL STUDY

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DURING the last year work has been carried out in this laboratory, for the Medical Research Council's committee on the care of shipwrecked personnel (MRC War Memo- [illegible] be published elsewhere; in the meantime results and conclusions which have to do with the consumption of sea-water are presented here. In particular the effects of drinking sea-water upon the chloride balance, the urea excretion, the urinary output, and the body-weight losses of the shipwrecked man—called for short, the "man on the raft"—are considered in some detail. *Some references to experiments in which salt water was* not drunk are also made.

An extensive series of experiments has shown that a man requires between 800 c.cm. and 1000 c.cm. of water per day to satisfy all his requirements, the actual amount varying with the previous metabolic history of the subject, his activity and his diet during the experiment. With an intake less than this he contracts a "water debt" to his own tissues. It was found that a man in water debt continues to produce 350–450 c.cm. of urine per day. The same low output was found whether the water debt was large or small and it was maintained throughout the longest experiments, which were for no [illegible] fell in a day or two to a low level. In all experiments the *diet provided not more than 1 gramme of sodium* chloride daily, but the excretion was greater than this, so there was always a slight negative salt-balance in those experiments where no sea-water or saline was drunk.

In addition to the physiological effects which are described later there was, under these experimental conditions, a definite psychological value in having the extra volume of fluid available for drinking, even though it was salt to taste. This was not only my personal

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* Receiving a research grant from the Medical Research Council

† [illegible]

TABLE I—OUTLINE OF EXPERIMENTS

—		Experiment number:						
		1	2a	Control to 2a	2b	Control to 2b	3	4
Subjects		3	5	5	5	6	5	2
Waterless period. Days ..		1	1	1	1	1	1	1
Preliminary fresh water period	Days ..	0	0	..	0	..	5*	2
	Daily intake (c.cm.)	..	..	..	..	..	540*	370
Salt water drinking period (1)	Days ..	4½	5	5	5	5	..	3
	Daily fresh water intake (c.cm.)	240	540	540	540	540	..	240
	Daily salt water intake (c.cm.)	180†	180	0	180	0	..	400
	Daily sodium chloride intake (g.)	6·3	6·3	0	6·3	0	..	14
Salt water drinking period (2)	Days ..	..	4	4	4	4	4	1½
	Daily fresh water intake (c.cm.)	..	60	60	60	60	60	0
	Daily salt water intake (c.cm.)	..	0‡	180*	180	0	180	240
	Daily sodium chloride intake (g.)	..	0‡	6·3*	6·3	0	6·3	14

* The subjects in this control experiment had a sea-water supplement in the second period and formed experiment 3.

† Saline; in all other experiments sea-water was drunk.

‡ The subjects in experiment 2a had no sea-water in the second period and became a control group for 2b and 3.

experience but was confirmed by unsolicited statements from, and by careful interrogation of, the subjects.

EXPERIMENTAL PROCEDURE

Four experiments have been carried out, with subjects drinking salt water or saline while in water debt. Table I gives the plan of each experiment. In the first three experiments the subjects were observed for the 24 hours immediately before the experiment, when their food and water intake was still unrestricted. In all the experiments the food ingested was the "shipwreck diet"; this comprises 1 oz. each per day of: biscuits; sweetened condensed milk; butter, fat or margarine; and chocolate. In experiment 1, after an initial waterless day, three subjects, for 4½ days, drank each day 240 c.cm. of fresh water supplemented with 180 c.cm. of 3·5% sodium chloride solution. In experiment 2, ten subjects, again after an initial waterless day drank, each day for 5 days, 540 c.cm. of fresh water supplemented with 180 c.cm. of sea-water; these subjects were compared with a control group of eleven under exactly the same conditions but without the sea-water supplement. After the 5-day period with 540 c.cm. of fresh water daily the sea-water drinking subjects were divided into two groups; one group of five (2a) ceased having the sea-water supplement and had a further period of 4 days with only 60 c.cm. of fresh water daily; the other group (2b) for the same period also had their fresh water cut to 60 c.cm. per day, but continued with the sea-water supplement of 180 c.cm. All the members of the control group already mentioned had their water intake reduced after the initial period with 540 c.cm. per day, to 60 c.cm. per day for the last 4 days, and five of these subjects received a sea-water supplement during this time of 180 c.cm. per day, making experiment 3. In experiments 1, 2 and 3. involving seventeen different subjects (one subject took part in both experiments 1 and 2) the daily intake of sodium chloride was 6·3 g. The sea-water used contained only 3·2% of sodium chloride and not 3·5%, so the ly intake was fixed in practice by sting the actual salt content of the water. In experiment 4 the subject who had been in both experiments 1 and 2 and another subject had, while on the shipwreck diet, first a control day with unlimited water, then a waterless day, followed by 2 days with 370 c.cm. fresh water daily; for the next 3 days they received daily 240 c.cm. of fresh water with a sea-water supplement of 400 c.cm. and for the last 36 hours no fresh water at all but a total of 600 c.cm. of sea-water. Added sea-salts, obtained by evaporating a portion of the same sample of sea-water to dryness, brought the sodium chloride concentration in the sea-water up to 3·5%, and the daily intake of salt was therefore 14 g. for the last 4½ days.

RESULTS

Chloride balance.—In all four experiments there was a lag in the excretion of sodium chloride. For the first 24 hours or more after beginning to take the salt water there was little change in the volume of urine excretion, with no rise in the chloride concentration, and hence there was a chloride retention; then suddenly, within the space of a few hours there was a great rise in the chloride concentration of the urine, and some increase in the urine volume, though the rise in this was more gradual; thereafter there was a balance between daily chloride intake and daily chloride excretion. It was noticed that the chloride retained during the latent period between increased chloride intake and increased chloride excretion balanced the amount of chloride that had been lost in the preliminary period upon the shipwreck diet with no water or limited water intake. This is the first point of interest; its possible significance is discussed later.

Nitrogen retention and blood-urea.—The nitrogen retention varied according to the condition of the experiment. In expts. 1, 2a and 2b the blood-urea rose during the waterless day an average of 8 mg. per 100 c.cm.; on drinking saline or sea-water there was no further change in the blood-urea throughout the period of the experiment in 1 and 2a, and throughout the first period of 2b. In the control group to expt. 2 the average rise was 8·4 mg. during the waterless day, and the blood-urea rose no further during the period when the water intake was 540 c.cm. per day with no sea-water. At this level of fresh water intake, therefore, sea-water had no effect on nitrogen retention. In the second period of expt. 2b and in expt. 3 the blood-urea rose in the 4 day period an average of 9 mg. per 100 c.cm. of blood above its previous raised though constant level: but in the control group having the same amount of fresh water, and the same diet and activity, but no sea-water, the average rise was 17·5 mg. In expt. 4 the blood-urea,

BLOOD-UREA CHANGES DURING WATER DEPRIVATION, (subject I)

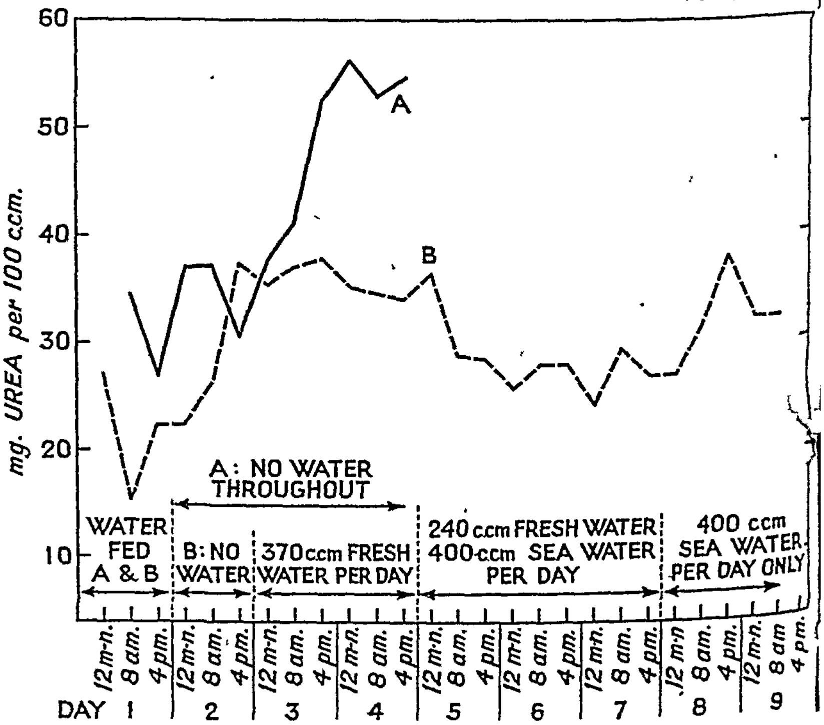

TABLE II—BLOOD AND URINE INVESTIGATIONS IN EXPERIMENT 4

Day of expt.	Conditions: shipwreck diet and		Subject 1						Subject 2					
			Urine			Blood-urea			Urine			Blood-urea		
	Fresh water (c.cm.)	Sea-water (c.cm.)	Vol. c.cm.	NaCl output g.	Urea output g.	Mid-night	8 AM	4 PM	Vol. c.cm.	NaCl output g.	Urea output g.	Mid-night	8 AM	4 PM
						mg. per 100 c.cm.						mg. per 100 c.cm.		
1	Unlimited	Nil	2260	8·55	25·78	20·2	19·5	16·8	2750	7·51	25·36	27·3	15·5	22·7
2	Nil	Nil	1567	2·65	13·09	12·9	28·0	28·6	1535	1·90	15·74	22·7	26·6	37·6
3	370	Nil	372	1·08	17·28	39·6	46·6	43·3	390	1·26	16·00	35·7	37·6	37·3
4	370	*Nil*	383	0·87	20·34	40·9	43·3	42·7	*385*	*0·70*	*17·19*	*38·0*	35·4	*34·7*
5	240	400	450	3·41	21·47	43·3	44·6	32·2	466	2·90	16·82	34·0	36·6	28·9
6	240	400	620	10·11	19·25	31·6	29·5	32·7	784	10·23	17·99	28·6	25·9	28·1
7	240	400	704	13·46	18·36	20·4	28·1	37·5	825	14·26	18·86	28·2	24·3	29·5
8	Nil	400	765	15·57	19·22	33·8	27·6	31·5	840	15·28	17·66	26·9	26·9	31·5
9 (half day)	Nil	200	442	9·88	8·50	35·5	34·5	..	438	8·60	10·05	38·1	32·1	..
9* (half day)	Unlimited	Nil	4031	17·88	39·37	..	..	24·3	1807	7·87	29·67	..	..	33·1
10* (half day)	..	..	..	..	..	31·5	30·2	..	..	..	..	36·1	23·6	..

* Second half of day 9, and first half of day 10 formed the rehydration period—unlimited food and water intake. Diet rich in protein.

aised during the waterless day, fell when the subject egan to drink sea-water, to the pre-experimental level nd remained there (see figure, curve B). The changes in he blood-urea may be of considerable importance; their mechanism will be discussed later.

Urinary excretion.—A diuresis occurred in all experiments *in which sea-water or saline was drunk. No* diuresis ever followed drinking fresh water in quantities nsufficient to rep[illegible] output was raised above [illegible] per day by an amount wh[illegible]found to xceed the volume of the ingested saline or sea-water. n the first part of expt. 2, the average urine output was [illegible] a-water. [illegible] sults of expt. 4; in addition [illegible] excretions it also shows the blood changes. In this experiment 400 c.cm. of sea-water was drunk daily, at first with 240 c.cm. of fresh water, and later with no fresh water; because of this greater intake the diuresis was greater than in the other experiments. In all experiments the ingested chloride was entirely excreted after the initial retention, without interfering with urea excretion. In experiments 2 and 3 the total daily urea excretion was slightly greater than that of the control subjects not drinking sea-water but with the same limited intake of fresh water. Changes in the urea excretion were reflected by changes in the blood-urea. In expts. 1 and 2, when there was a relatively high fresh water intake with 180 c.cm. of sea-water per day, the blood-urea remained *at a relatively low level. In the second period of* [illegible] sea-water intake was still 180 [illegible] water was only 60 c.cm. per [illegible] blood-urea rose, but less than in the control subjects. In expt. 4, with 400 c.cm. of sea-water daily, there was a fall in the blood-urea to the normal figure (see figure, curve B). The final effect, therefore, of the diuresis varies with the level of fresh water intake and the amount of sea-water taken; this point is further discussed below.

Body-weight.—The rate of weight loss was not much affected by drinking sea-water. The average weight loss of the subjects in expts. 2a and 2b, when they were drinking 540 c.cm. of fresh water and 180 c.cm. of sea-water per day, was the same as that of the subjects in the control group who had the same fresh water but no sea-water. In the second part of expts. 2b and 3, the daily fresh water intake was only 60 c.cm. but there was a sea-water supplement of 180 c.cm. per day; these subjects lost during the whole 4-day period an average of 3·90% of the initial body-weight for the 4-day period, while the average weight loss for the control subjects was 1·54%. In expt. 1, subject 1 was drinking 240 c.cm. of fresh water and 180 c.cm. of 3·5% sodium chloride each day; his rate of weight-loss in the experiment was definitely less than in a previous experiment when he drank the same amount of fresh water, ate substantially the same diet, but had no sea-water. No comparisons were available for expt. 4, but the body-weight curves of both subjects showed definite fluctuations at the time of the change from 370 c.cm. of fresh *water daily to 240 c.cm. of fresh water with 400 c.cm. of* sea-water; these fluctuations suggested a diminished rate of weight-loss when sea-water was drunk. No further discussion on this point is necessary.

DISCUSSION

From these experiments several important points emerge. The first is that the man on the raft, on the shipwreck diet, when he is not drinking sea-water is in negative chloride balance. If and when he begins to drink salt water, chloride is retained until the amount of chloride previously lost is made good. The initial loss of chloride from the body must result in an absolute salt deficiency; but, relative to the fluid content of the body, there is no actual salt deficiency during water deprivation. This is shown by the increase in the concentration of the sodium in the serum (my own observations; unpublished observations by McCance, 1943; Russel Elkinton and Taffel (1942), which indicates a general rise in the body osmotic pressure. Sodium chloride loss is [illegible] lost early in water-deprivation is from extracellular sources, and that that lost later is mostly intracellular in origin. Russel Elkinton and Taffel fasted dogs completely (neither food nor water) for 12 days, making full metabolic studies. They confirmed on dogs Wiley and Wiley's *observation* on men, and also showed that the [illegible] that 30–55% of the [illegible] as lost, compared with only [illegible] water. They suggest that [illegible] ody to conserve its extracellular fluid at the expense of the intracellular.

The restoration of the total sodium-chloride content of the body to its pre-experimental level seen in the present experiments may have been another manifestation of the same tendency. This relative retention of chlorides will give rise to an increase of osmotic pressure in the extracellular fluid. In consequence, water is immediately *drawn out of the cells to restore the osmotic balance and* thereby replenishes the depleted extracellular reservoir at the expense of the intracellular fluid. This must occur, but whether it is part of a protective mechanism or only a coincidence it is not possible to say from the present evidence.

The amount of sea-water allowed was calculated on the assumptions, first, that at low levels of intake at least 60% of the water ingested as sea-water is excreted as urine additional to the basic output of 400 c.cm. per day; and second, that all the urine excreted under such circumstances can carry the maximum concentration of sodium chloride, that is, 2% (Davies et al. 1922). If x c.cm. of sea water are drunk or otherwise ingested the sodium chloride intake will be $35x$ mg.; the urine output will be $(400 + 0{\cdot}66x)$ c.cm. If there is to be no salt-retention then chloride output must equal chloride intake; if the urine contains the maximum amount of sodium chloride then at chloride balance

$$35x = (400 + 0{\cdot}66x)20$$

This gives an approximate value for x of 400. In practice it was found that with 400 c.cm. of sea-water per day more than 66% of its water content was lost in the urine. The maximum concentration of sodium chloride in the urine observed by Davies and his colleagues was confirmed; in experiment 4 the maximum chloride concentration in the urine of subject 2 was 2·00% and in the urine of subject 1, 2·30% of sodium chloride.

No references have been found in the literature to the physiological effects of drinking sea-water but the effect of rectal instillation has been examined in some detail. Experiments have been reported by Foy, Altmann and Kondi (1942) on this subject, and Bradish and his colleagues (1942) followed the effect of instillation of sea-water not only into the rectum but also up into the colon. The former workers gave repeated sea-water enemas to three subjects in the course of 80 hours during which they were deprived of water; on the first day as much as 1300 c.cm. were given, on the other days four enemas of 200 c.cm. each; a control group had no sea-water enemas and was totally deprived of water for the same period. In the sea-water group there was a 50% greater weight loss, less hæmoconcentration (the authors considered the hæmoconcentration the same in both groups, but the figures suggest otherwise), and—except for one man who had a gross rise—only a slightly greater rise in blood-chloride concentration. The latter workers, after "a condition of water deprivation was established" instilled 600 c.cm of sea-water into the rectum and colon of normal subjects and into the colon of a patient with a colostomy; in all subjects weight-loss was increased. In the patient, samples recovered from the colon at intervals showed a progressive dilution, and not all the chloride could be recovered at the end of the experiment. The conclusion was arrived at that the sea-water became diluted by osmotic absorption of body fluid, and that chloride was absorbed. Both groups of workers agree that sea-water per rectum during water deprivation accelerates the weight-loss, and increases the osmotic pressure of the body fluids because of chloride absorption.

In both the above investigations large volumes of sea-water were used over a short period; if smaller amounts had been used it is probable that different results would have been obtained. The kidney cannot excrete on an average more than 2% sodium chloride. Hence, if all the chloride is absorbed from the gut, and there is to be no chloride retained in the body, the volume of urine to be excreted must be at least 1·75 times the volume of sea-water ingested, taking sea-water as containing 3·5% sodium chloride. Therefore if 400 c.cm. of sea-water are absorbed per day the urine volume must be 700 c.cm., that is, 300 c.cm. above the basic urine level and giving a gain of 100 c.cm. of water; but with 800 c.cm. the urine volume must be at least 1400 c.cm., 1000 c.cm. above the basic level thereby resulting in a loss of 200 c.cm. of body water if all the salt is to be excreted. These calculations cannot be applied to the reported work on rectal instillation as the amounts absorbed were not recorded by these workers.

In regard to nitrogen-retention there are three different conditions to be discussed: complete deprivation of water; partial deprivation of water; and the ingestion of sea-water with or without small quantities of fresh water.

During complete water deprivation the total volume of body fluid is decreased, hence unless urea excretion is increased the concentration of urea in the body will rise. In addition the man on the raft is on a low calorie diet, so he has an increased tissue breakdown and increased urea production. Unless the clearance of urea increases therefore the urea concentration will rise. The total [illegible]ce depends on the concentration of urea in the [illegible]; this is governed by the urea concentration in the plasma. As the concentration in the body fluids, and hence in the plasma, rises the concentration in the urine also rises, so that the ratio between urine-urea and plasma-urea concentrations (the U/P ratio) remains about the same. In this way the rate of rise in concentration of urea in the body fluids is kept in check and the concentration itself, as reflected by the plasma-urea rises only slowly. When, however, the ceiling concentration for urea in the urine is reached, further rises in plasma-urea concentration can no longer be followed by rises in urine-urea concentration; the U/P ratio falls but the urine volume is unchanged and so the plasma clearance is diminished and the concentration of urea in the body then rises more rapidly (see figure, curve A).

When only a little water is drunk, the drain on the body fluids is diminished, therefore the potential rise in the urea concentration of the body fluids is less. The amount of urea that has to be excreted in order to prevent this rise in concentration is correspondingly smaller, and this level of excretion can be achieved at a concentration of urea in the urine at or below the ceiling. This urea concentration is attained with a normal U/P ratio and only a slightly raised level of urea in the plasma; the plasma-urea remains steady at this slightly increased level (see figure, curve B).

When sea-water alone is drunk the urine volume rises if the U/P ratio remains high the clearance is increased With 180 c.cm. of sea-water daily and very smal quantities of fresh water (expt. 2b and expt. 3) th blood-urea still rose, though the average urea outpu per day was 1 g. greater than in the control group wh had no sea-water. This difference in output was reflected by the lower blood-urea levels in the subjects drinking sea-water. With 400 c.cm. of sea-water and 240 c.cm. of fresh water per day the increased uri output permitted such a good clearance that a raised blood-urea was brought back to the pre-experimenta level; and when the fresh water was discontinued there was only a slight increase in the blood-urea (see figure curve B). Drinking sea-water, therefore, in these quantities diminishes or prevents nitrogen retention and possibly to this extent may benefit the man on the raft.

SUMMARY

The effects of drinking up to 400 c.cm. of sea-water daily, when either totally or partially deprived of fresh water, and on the low-calorie and low-salt diet of the "man on the raft" may be summarised as follows:

An increase in urine output, with an improved total urea-clearance;

A slight gain to the body of water, because the extra water lost in the urine is less than the extra water ingested as sea-water;

An initial retention of chloride equal to the chloride lost before beginning to drink the sea-water; and subsequently full excretion of all the chloride ingested.

I wish to thank the Medical Director-General of the Navy for permission to carry out the large scale experiments at a Royal Naval Hospital, and the Surgeon Rear-Admiral commanding the hospital for the facilities extended to me there. I wish to express appreciation to the subjects who voluntarily underwent the rigorous conditions of the experiments, and to the laboratory and clinical staff without whose help much would have been left undone. I must also thank Dr. B. S. Platt and Dr. E. A. Carmichael for their encouragement.

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LCC NURSERIES.—During the past year admissions to the Council's four London nurseries have nearly doubled and at present over 70 babies a week are being admitted. It is no longer possible to send enough children to short-stay nurseries in the reception areas to keep vacant cots in London for day-to-day needs. The Council is therefore opening a new nursery in Maitland Park Road, N.W.3, which will accommodate 36 babies.

PNEUMONITIS ASSOCIATED WITH AUTOHÆMAGGLUTINATION *

S. Shone
M D LOND, M R C P
MAJOR IMS

R. Passmore
D M OXFD
CAPTAIN IMS

(From a Combined Indian General Hospital, Middle East)

While investigating a case of fever, we observed that, when a drop of blood was placed on a slide, the red corpuscles immediately separated into clumps. Furthermore, when an attempt was made to count them, they were agglutinated in the diluting chamber of the hæmocytometer pipette. In this patient, apart from the fever, the only clinical findings were moist sounds at the bases of the lungs. His illness appeared similar to that of other patients with fever and cough then under our care. Their blood was accordingly examined, an [illegible] of red cells in varying [illegible] the medical wards led to [illegible] ses in which the predomin[illegible] adual onset, were fever and cough, the latter often associated with vomiting, hoarseness of voice, and the presence of fine crepitations in the lungs: all showed the phenomenon of agglutination of red corpuscles.

The following observations are based on 54 consecutive cases of this form of pneumonitis, of which 50 came from two companies of the Royal Indian Army Service Corps, which had recently arrived from India together, and the remaining 4 were in other RIASC sepoys, who had had an opportunity to mix with these companies at the nearby training centre. The men had been recruited six months previously in the Delhi-Meerut-Lucknow area. They had been in camp near Delhi, where the incidence of fresh malarial attacks was high, and some of them were still suffering from the effects of this disease. Admissions with symptoms attributable to pneumonitis began shortly after arrival in the Middle East:—

Weeks after arrival	1	2	3	4	5	6	7
Cases admitted	4	10	8	13	5	9	5

The principal incidence was in December, when the nights were cold, the days warm and sunny and the atmosphere dry. There was no unusual incidence of catarrhal infections of the respiratory tract either in these two companies or among other Indian troops in the locality.

CLINICAL FEATURES

The cases may conveniently be divided into four groups: (i) atypical pneumonia; (ii) short fever with cough and persistent lung signs; (iii) afebrile laryngitis with little or no lung involvement; and (iv) proved malaria or splenomegaly with laryngeal or lung affection.

Group I.—The 13 sepoys in this group had a severe febrile illness lasting six days or more.

The fever usually exhibited a daily swing from normal to as high as 104° F. In 7 patients, after the initial bout of fever, there was a relapse which in some cases was more severe than the original attack. In 2 patients there were repeated relapses, and they were febrile for 31 and 46 days. Sulphapyridine was given in 7 cases; in 2 the fever was completely suppressed and in the remaining 5 there was partial [illegible]

[illegible] of all proportion to the physical signs in the lungs was noted in 3 cases, but in only 1 of these was there cyanosis. The nasopharynx was congested in 2 cases only.

The most frequent findings in the lungs were fine moist sounds, usually at the bases and axillæ but sometimes in other localities such as the sub-apex. These crepitations sometimes persisted as long as three weeks after the fever had subsided. The percussion note was impaired over the affected areas but there was never bronchial breathing or other evidence of classical consolidation. The sputum was characteristically copious, frothy, and mucopurulent with occasional flecks of blood. All these patients were radiographed by Major G. A. Maddocks, RAMC, and in 9 of them the X-ray appearances indicated parenchymatous lesions in the lungs, more extensive than the physical signs suggested.

No skin rashes were observed and no enlargement of lymph-glands. Neurological features were absent and the cardiovascular system was little affected. The urine contained no albumin or sugar and negligible deposits. The liver was not enlarged, and though the spleen was moderately enlarged in 3 cases, it was hard, and its condition could be attributed to previous malarial infection. Repeated blood smears failed to reveal malarial parasites or spirochætes. All the patients recovered and were sent to a convalescent depot after 4–10 weeks in hospital.

At the time these patients were in hospital, the only laboratory equipment immediately available was a microscope and a hæmocytometer; so specimens for bacteriological examination had to be sent several miles to a laboratory already busy with other routine work. Blood cultures (in 8 cases) were sterile; sputum cultures (3 cases) showed no constant or significant organism; and lung puncture (3 cases) yielded no pathogens. The Weil-Felix reaction was negative with OX19, OXK and OX2 antigens in 8 cases. The Kahn was negative in 5 patients tested.

Of the 13 patients 9 showed a leucocytosis, which varied from 12,000 to 61,000. The polymorphs never exceeded 88%, but there was a well-marked shift to the left and in 2 cases definite myelocytes were seen in the peripheral blood. In 5 of the patients there was a mononucleosis, which in one case was as high as 16% of 22,000 cells. In another man there was a notable lymphocytosis. Thus the differential blood-picture was by no means uniform.

Autohæmagglutination was exceptionally rapid in 3 of the cases. In 2 it was initially impossible to do a blood-count. In the third an independent observer, in the course of routine blood-grouping, reported complete agglutination on the wire loop which he was employing to transfer blood from the finger to the serum.

Group II.—This group comprises 15 sepoys with a mild febrile illness of less than six days.

All showed cough and basal crepitations and in some instances these persisted a fortnight after the fever subsided. In 7 cases there was laryngitis, and in 6 vomiting with the cough. Sputum resembled that in group I. The nasopharynx was congested in only 2 cases; there were no positive X-ray findings. The spleen was enlarged and hard in 6 patients, but blood examination revealed no malarial parasites or spirochætes. In 5 there was a mild leucocytosis.

Group III.—In this group we include 12 cases of laryngitis. They were afebrile in hospital but 9 gave a history of fever just before admission.

Only 2 showed any congestion or œdema of the pharynx but in 7 a few crepitations were found at the bases of the lungs. All 12 patients had cough and 5 had vomiting. Capt. Sanjiva Rao, IMS, who kindly examined several of the patients, reported some œdema and congestion of the larynx but no ulceration. The laryngitis usually persisted for 2–3 weeks. In 6 cases there was a hard palpable spleen, but again no blood parasites were found.

Group IV.—The remaining 14 patients comprise 9 in whom malarial parasites were found in the blood and 5 in whom the spleen was much enlarged.

All of them presented respiratory features: 13 had persistent crepitations in the lungs, not necessarily basal, and 6 had laryngitis; rhonchi was noted in 4 cases only. The throat was innocuous in all. The fever was variable and responded to quinine, although in 3 instances there was a short recrudescence of pyrexia on withdrawal of the drug.

AUTOHÆMAGGLUTINATION

Autohæmagglutination is defined by Boxwell and Bigger (1931) as "a clumping of erythrocytes into irregular masses, visible to the naked eye, occurring in the presence of the individual's own serum, without bacterial action, at air temperature, and reversible at body temperature." In this paper we restrict the term to the separation, within two minutes and in the midst of a clear plasma, of clumps of erythrocytes, readily visible to the naked eye. No incubator was available to study the critical temperature at which this change occurred, but there seems little reason to doubt that it was at or about body temperature.

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* *This paper, dated Feb. 8, 1943, reached us at the beginning of July.*
of Lieut.-Colonel
Cold Agglutinins
To facilitate early

To determine whether the agglutination was due to a peculiarity of the red cells or of the serum, in 30 cases serum and cells were separated and the former tested against accredited O (IV) corpuscles. On every occasion agglutination took place. Two sera were tested and found to agglutinate rabbit and sheep cells in addition. It can therefore be assumed that in our series the phenomenon was attributable to the presence of a non-specific agglutinin in the sera, capable of agglutinating any red corpuscles. Coincidently with the clinical improvement, the rate of agglutination and the size of the aggregates were gradually diminished. On discharge from hospital the majority of the patients still showed some pathological clumping, but in about a third it no longer occurred.

A study of the available literature showed that autohæmagglutination was reputed to be rare. It has been reported in a variety of diseases—notably affections of the liver and spleen, severe anæmias and chronic sepsis—and occasionally in normal people (Boxwell and Bigger 1931, Whitby 1942). The only disease in which autohæmagglutination is claimed to be almost constant is trypanosomiasis and Yorke (1911) found it in animals with trypanosome infection. Manson-Bahr (1935) states that it is often noted in kala-azar.

We have sought for autohæmagglutination in 331 sepoys other than those with pneumonitis, and the results are summarised in the accompanying table. In the cases recorded as positive, the agglutination was similar to that seen in the pneumonitis series but it was seldom so coarse or so rapid. We have not seen more than a fine granularity in the blood of a healthy person, and apart from the afebrile members of our series, we have not found agglutination except in patients suffering from some serious ailment, usually of an infective nature. In these the phenomenon appears to be by no means uncommon, which is not altogether unexpected since in these diseases the erythrocyte sedimentation-rate is often accelerated. The high incidence in cases of chronic malaria is interesting and suggests further inquiry.

INCIDENCE OF AUTOHÆMAGGLUTINATION IN 331 SEPOYS

—	Number tested	Autohæmagglutination present
Chronic malaria (splenomegaly, malarial anæmia and febrile relapses)	37	20
Miscellaneous, acute and chronic respiratory infections	41	2
Tuberculosis { pulmonary	46	19
Tuberculosis { non-pulmonary	5	2
Infective hepatitis	8	2
Nephritis	3	1*
Leprosy { nodular	1	1
Leprosy { anæsthetic	5	0
Severe battle casualties	35	7†
Miscellaneous non-septic surgical	42	0
,, afebrile medical	48	0
Healthy sepoys	60	0

* Severely anæmic. † All with chronic sepsis.

DISCUSSION

There can be no question that the illness attacking our 54 patients was an infection, usually involving the parenchyma of the lung. It is reasonable to describe the disease as a pneumonitis and to regard the cases as a graduated series, at one end of which the lung features were so mild that no clinical signs were observed after admission of the patients to hospital. Indeed, these latter cases may be considered a *forme fruste* of the infection.

Pneumonitis or atypical pneumonia is, in our experience, not at all uncommon among Indian troops in the Middle East, but we have never previously seen so [illegible] in one unit within so short a time. In an annotation on the rickettsias, the *Lancet* (1941) states that "recent observations suggest that many rickettsial infections involve the lungs, setting up a pneumonitis or interstitial pneumonia," and it is therefore relevant that all the patients examined were heavily infested with lice, as indeed were all the men in the two companies involved. The association of chronic malaria with so many of the cases must suggest the possibility of a malarial basis for the disease, but an outbreak of malarial pneumonitis is outside all previous experience. In these circumstances the nature of the infective agent, with its peculiar affinity for the lungs and the larynx, remains a matter for speculation.

SUMMARY

An outbreak of pneumonitis in an Indian unit is described. Autohæmagglutination was found in all 54 cases.

Our thanks are due to Lieut.-Colonel P. A. Dargan, IMS, for permission to publish this paper and to Jemadar M. Bhattacharya, IMD, for his assistance.

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URINARY TRACT INFECTIONS
IN THE ROYAL NAVY

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IMPRESSIONS of the incidence of given diseases in the Forces in war-time as compared with their incidence in normal civilian practice are apt to be ill-founded, because a picked and normally healthy population of a particular age-group is under observation. Only members of the same branch of the Service in the prewar years can offer a true basis of comparison; and using these as controls it is also possible to assess the influence of war conditions on the trend of a disorder. In a review of ailments in naval personnel admitted into an EMS hospital in 1942, urinary infections seemed surprisingly prominent. It was possible to confirm this impression by comparison with data in the Statistical Report of the Health of the Royal Navy for past years. The year 1935 was chosen merely because it is relatively recent.

At that time the Navy carried a force of 86,343, and the number of cases in the sick-list was 37,963. Infections of the urinary tract grouped under various headings—cystitis (60), pyelitis (39), bacilluria (12), pyonephrosis (3), trigonitis (1), pyuria (1)—formed a total of 116 cases; this works out at about 3 per 1000 of sick cases, and 1·34 per 1000 of total strength. The number of Naval admissions in 1942 into the EMS hospital was 5093, and of these, 172 were found to be suffering from an infection of the urinary tract—an average of 33·75 per 1000 admissions, or more than 11 times the prewar incidence.

It is interesting to contrast the figures of the Royal Air Force (Rook 1938). Between the years 1926 and 1936, the yearly average was 1 case of pyelitis or cystitis per 1000 strength. Rook divided his series into two groups according to whether the affected person was stationed in the United Kingdom or serving abroad: the incidence in the latter was 1·7 cases per 1000, and in the former 0·7; so that service abroad seems to be an important ætiological factor. A further deduction which can safely be drawn from the relative small difference between prewar incidence in the RAF and in the Navy is that conditions in the Navy in peace-time do not favour any increase of infections of the urinary tract: the great increase encountered can only be attributed to the abnormal conditions of war.

Of the 5093 admissions to the EMS hospital, 485 were officers, 213 WRNS and 4395 ratings; and among these, 11, 18 and 143 cases of urinary infection were found. An incidence of 84·5 per 1000 sick cases is obtained for the WRNS, but this cannot be regarded as having weighted the average figure unduly, for even when the female section is excluded, the rate works out at about 32 cases per 1000. No parallel figures are available to show the trend of urinary infections in the WRNS as compared with those in the female adult population of peace-time.

The onset was nearly always acute, with malaise, anorexia and general aching of the body, so that often the diagnosis was mistaken. Pyrexia was commonly present, lasting as a rule only two or three days. A [illegible]

[illegible] and nausea in a few cases; constipation was not more prominent than in other admissions to hospital. Frequency of micturition was by far the commonest symptom, and definitely indicated the diagnosis; but the patient seldom volunteered information about frequency spontaneously, and direct questioning was necessary. Pain, when present, was situated over one or more of the recognised sites—the lumbar region posteriorly, along the lines of the ureters, the hypogastrium, and along the urethra during micturition. In nearly all cases tenderness was found over some area of the genito-urinary tract, even when spontaneous pain was absent. All cases recovered, and no complications were encountered if one excludes acute non-specific epididymo-orchitis, seen in 8 patients. It is debatable whether this condition can definitely be ascribed to the urinary infection, since in some cases of the kind no urinary infection or other ætiological agent could be demonstrated.

The first 100 cases of urinary infections were compared, as regards [illegible] a similar number of [illegible] wards at various p[illegible] found to suggest t[illegible] definite relation t[illegible] developed in some [illegible] treated in the ward[illegible]

Symptomatology [illegible] from that among the men; t[illegible] systemic reactions were not [illegible] hospital was longer. The attack was the first in nearly all the men, but among the WRNS a history of a previous bout was not uncommon. In 172 cases the incidence of various symptoms was as follows: frequency of micturition 130; backache 62; pain in right loin 30; pain in left loin 30; pain in hypogastrium 15; painful micturition 35.

In 56 cases another malady coexisted, but there was no significant correlation with any particular disease. The associated conditions were: anxiety state 9; bronchitis 5; cellulitis of ear 1; duodenal ulcer 3; dysentery 1; epididymo-orchitis 8; gastritis 5; glandular fever 2; gonococcal arthritis 1; hæmorrhoids 1; hyperpiesia 1; infective hepatitis 2; malaria 2; nephrectomy 1; papilloma of bladder 1; pregnancy 1; prostatitis 1; renal calulus 5; and tabes dorsalis 1.

To assess the possible influence of seasonal variations on the incidence of urinary infections in this series, it would be necessary to know the weather conditions prevailing at sea or port of debarkation at the time of onset. This information could not be collected but the number of cases admitted to hospital in each month of the year are noted in table I. It will be seen that there is a fairly even distribution throughout the twelve months.

TABLE I—CASES OF URINARY INFECTION ADMITTED IN EACH MONTH OF 1942

	Cases		*Cases*		*Cases*		*Cases*
Jan.	8	April	12	July	17	Oct.	19
Feb.	15	May	16	Aug.	14	Nov.	13
March	13	June	18	Sept.	16	Dec.	17

The largest number of cases fell within the 20–30 decade (table II), but this may merely reflect the larger number of personnel of this age-group at present serving in the Navy.

TABLE II—AGE-GROUPS OF PATIENTS WITH URINARY INFECTION

Age (years)	*Ratings*	*WRNS*	*Officers*
17–20	18	7	1
20–30	68	9	6
30–40	39	2	2
40–60	18	0	2

Hammond (1935) considers that, with men, a catheter specimen of urine is unnecessary for bacteriological examination. Midstream specimens of urine were therefore regarded as satisfactory from men, while women were catheterised. A few staphylococci or coliform organisms were taken to be due to contamination, but when any doubt existed, a catheter was passed. By far the most common offending organism was *Bacillus coli*. No attempt was made to classify the coliform bacilli into the groups suggested by Hill, Seidman, Stadmichenko and Ellis (1929). Staphylococci were found in very few cases, and these were nearly all WRNS. *Streptococcus fæcalis* was the sole infecting organism in 28, while a mixed infection of *S. fæcalis* and *B. coli* was found in 19. In several patients the flora of the urine was seen to change during treatment from *B. coli* to *S. fæcalis*, or vice versa.

Microscopy of urinary sediment revealed a variable number of pus cells, and in men spermatozoa were not uncommon. Cells [illegible] the urinary tract were [illegible] present in some 50 cas[illegible], and only persisted for a few days. Frank hæmaturia was found in 16 cases, and even when the results of chemical tests for blood were negative, a few red cells were often reported on microscopy. The sediment was usually mucopurulent, but only during the first few days. An offensive urinary odour was rare.

Treatment was by rest in bed, forced fluids and a citrate and bicarbonate alkaline mixture, given at two-hourly intervals until the reaction of the urine was alkaline, and then reduced to four-hourly dosage. Results were good and the urine was usually sterile within two weeks. Rest in bed and the large intake of fluid were probably the important factors, and contributed to the good results. Subjective symptoms disappeared within 3–4 days. A small number of cases were resistant; the usual course then was to give ammonium chloride in sufficient dosage to render the urine acid, and a hexamine mixture. If these failed, a return to alkaline therapy nearly always succeeded. Mandelic acid preparations were also efficacious. The value of sulphonamides in urinary infections has become firmly established; they were not often employed in this series and no attempts at comparison of their efficacy were made. Infections in WRNS were more resistant to treatment of all types, and required a longer stay in hospital than infections in men.

DISCUSSION

The mode of invasion of the urinary tract by infection is still unsettled. The three routes—hæmatogenous, lymphatic and ascending—all have their protagonists. A noteworthy feature in this series was the sharp onset with fairly severe constitutional disturbance, suggesting a systemic infection or toxæmia. No blood-cultures were examined to establish the possibility of a blood-borne infection, but it is now generally accepted that in so-called normal subjects organisms periodically gain access to the blood. These organisms may be destroyed in the blood-stream, but if not, the kidneys offer the natural channel for their elimination, and this is the course of events surmised by many in the ætiology of pyelitis. The urethra offers a site from which, after but slight trauma, organisms are rapidly absorbed into the blood. The question of masturbation and the resulting injury of the urethra, the proximity of the rectum, contamination of the fingers and the lack of preputial toilet forms an interesting chain of circumstantial evidence. Even the change of type of infecting organism seen in several of the cases could be explained by a subsequent bacteræmia. It may be argued, however, that the inflammatory swelling and spasm of the ureters partially obstruct the urinary flow, and account for the generalised symptoms at the onset of the illness. Furth[illegible] as shown that injection of *B.* [illegible] even when the kidney has be[illegible]ssarily produce urinary infect[illegible] explain cases of septicæmia [illegible] n those usually isolated from [illegible] tract; in these a true inflammation of the tract does not occur; does the nephron exert any selective action in the elimination of different types of bacteria?

Rook refers to the experiments of MacKenzie and Wallace (1935) who injected dyes into the lower parts of the urinary tract. It was found that in every case the dye passed to the lymphatic chains running up along the aorta, and in no instance could the dye be found passing up the ureteral wall or the peri-ureteral lymphatics. The lymphatic route, however, may operate indirectly, conducting the organisms to the blood, and thence arriving at the kidney.

The greater liability of women to these affections is in favour of ascending infection, and has been explained in terms of the shorter length of the female urethra. Men were asked their own views of contributing factors. Some mentioned that owing to the special nature of their duties they were only able to empty their bladder at long intervals; and strenuous work might have to be done with the bladder distended. This would increase intravesical pressure, and possibly have secondary effects upon the ureters. Stagnation may also play its part. Learmonth (1937) considers that ascending infection by way of the ureter is the most probable hypothesis.

Hammond points out that whatever route the organisms travel along, they always seem to come from the intestines, and he stresses the importance of the hyposthenic constitution. Coli infections, he says, are not common in strong and robust people, and when they do occur, there is some lowering of vitality through long physical or mental fatigue. I have been struck by the tired and anxious appearance of many of the men admitted during the year under survey, and have noticed how quickly their general health responds to rest in hospital. It may be that this state of fatigue predisposes to infection. The urinary tract was fully investigated in only a few cases, but it is unlikely that organic disease of this system was present in large numbers of these patients, all of whom had previously been healthy and recovered quickly from their illness.

SUMMARY

Infections of the urinary tract in the Royal Navy are common.

Men of age-groups (20–30) not ordinarily considered liable to this disease formed the bulk of the cases reported here.

The onset was acute, with constitutional upset lasting a few days, and cure followed simple therapy, usually within two weeks.

No complications were recorded, no definite ætiology was ascertained and no prophylaxis can be advocated except avoidance of over-distension of the bladder.

Coliform organisms were isolated from the urine in most instances.

Age and the particular season of the year in this country did not appear to have any influence on the incidence.

I have to thank Temporary Surgeon Rear-Admiral J. W. McNee, Dr. J. A. Wilson and Dr. A. M. Scott for their kind help, my surgical colleagues for access to their case-records, and the Medical Director-General of the Navy for permission to publish this paper.

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Reviews of Books

Queen Charlotte's Textbook of Obstetrics

(6th ed.) By the members of the clinical staff of the hospital. (Churchill. Pp. 577. 25*s.*)

THE new edition of this popular textbook is arranged like its predecessors. It has been altered, however, to bring the text into line with modern methods, and a small section has been added on postnatal care. The clinical staff of the hospital, with four specialists in subjects allied to clinical obstetrics, have presented in a clear and readable form the current practices of our senior lying-in hospital. The section on development is notably good, and that on puerperal pyrexia should be read especially by those responsible for institutional midwifery. Early rotation of complicated occipito-posterior cases is advised, but it is perhaps disappointing that the authors do not consider this best achieved by seeking the posterior shoulder and leaving the head to look after itself. Compression of the fœtal head during repeated attempts to rotate a difficult case may be harmful, but manipulation of the shoulder involves no such danger. The view that the breech with extended legs has a worse prognosis than the other varieties will not be universally accepted. The section on the pelvis perhaps emphasises too much the average measurements without mentioning the equally important standard deviations. The section on forceps is not well illustrated. Apart from such minor shortcomings, the book contains all the information that the medical student and recent graduate require for a sound working knowledge of obstetrics.

Synopsis of Surgical Anatomy

(5th ed.) ALEXANDER LEE MCGREGOR, M CH EDIN., FRCS. (Wright. Pp. 710. 25*s*).

THE few minor changes which have been made in this book since it first appeared speak well for its conception and execution. Developments of surgery requiring extensive knowledge of anatomy have caused Mr. McGregor to add a full account of the latest views on the anatomy and physiology of the automonic nervous system. In this field the anatomist and physiologist have followed the experimental surgeon. The author has extracted the essentials of Codman's work on the er, and ably described the anatomy of the various of this region, using his own cases to illustrate l points. These two sections, with a short and rather incomplete account of the anatomy and pathology of the intervertebral disc, comprise the main additions. The excellent diagrams are still a feature of the book, which though not for the tyro (being written in tabulated form) should certainly form part of the library of the candidate for higher degrees and of the professional surgeon.

Annual Review of Physiology

Editors: J. M. LUCK, V. E. HALL, Stanford University. (Lewis. Pp. 613. 31*s.* 6*d.*)

WE commend the decision of C. V. Taylor, one of the contributors to this annual digest of new knowledge, "to find a theme which might not only represent some present research trends but also help tie together the reviewed accounts, even at the risk of some serious omissions." The reviews written in this way, as in previous volumes, make better reading than the other contributions, but they are all valuable, and the editors may well be thanked for maintaining this service to medical science in spite of the increasing difficulty of obtaining journals and contributors from abroad. The growing tendency of reviewers to write in a readable and explanatory way is satisfying, and the editors show no signs of stereotyping their table of contents. Subjects earning for the first time an article to themselves are the physiology of bone, nerve and synaptic transmission, and biological assay.

Ambulance Hand Book

(14th ed.) E. G. GERSTENBERG, FRCSE, FRFPSG; J. B. GAYLOR, FRFPSG, W. C. GUNN, MD. (St. Andrew's Ambulance Association. Pp. 432. 2*s.* 6*d.*)

THIS book on the principles of first-aid to the injured has reached the impressive total of 14 editions since 1933, and its popularity is justified. No concession is made to the relatively illiterate, and the style is reminiscent of the rolling periods of Sir Walter Scott. The preface says: "St. Andrew's Ambulance Association still adheres to the principle that in order to practise ambulance work, a knowledge of the human frame and of the nature of life is fundamental. For this reason anatomy and physiology are dealt with in considerable detail so that the advanced pupil may be able to understand the principles which govern the practice of first aid." The aim is fulfilled though with a greater use of anatomical and other technical terms than is usually found in first-aid books. The illustrations, especially the photographic plates, are very good.

THE LANCET

LONDON: SATURDAY, OCTOBER 9, 1943

FATE OF SKIN HOMOPLASTS

Grafts from a patient's own skin, it is fairly generally agreed, will survive under favourable conditions to cover a denuded surface, while those from another person will not. Skin from a stranger will persist for a time, but finally and with few exceptions will be cast off. An explanation widely accepted is that the donor's epithelium is treated by the host as a foreign protein · it provokes an antibody which is able to destroy it. A regular exception to this rule is, significantly, the permanence of grafts between monozygotic twins. Similarity of blood antigen between recipient and donor, however, carries no assurance that a graft will be acceptable. The theory that the epithelium of another person gives rise to damaging or destructive antibodies in the plasma and fluids of the host is derived from serological and immunological knowledge in general. The possibility that blood and connective-tissue cells share in the rejection of foreign tissues and cells, either directly or through the intervention of opsonins, has never been excluded. The opportunity to test this second possibility has been seized by Gibson and Medawar[1] with the coöperation of a patient suffering from a large denuded burnt area of skin. The wounded area was put at rest, and kept suitably covered and bacteriologically clean; only *B. proteus* was ever grown from it. Transplantation on to the surface avoids almost entirely any foreign body reaction due solely to insolubility—such, for example, as fat and keratin are likely to provoke. There was some evidence of this kind of reaction but figs. 7 and 24 suggest that polymorphism of epithelial cells may have been mistaken for a foreign-body giant-cell reaction. Part of the denuded surface was grafted with autoplasts, part with homoplasts from a relative, and yet a third area with a second set of homoplasts from the same relative 15 days later. Gibson and Medawar then removed one graft with its bed from each of the first two sets at intervals of 5, 10, 15, 23, 31 and 36 days, for histological examination and comparison. According to expectation the autoplasts spread and became part of the new epithelial covering while the first set of homoplasts, after a good start which included vascularisation, began to degenerate between the 10th and 15th days, and by the 23rd day the epithelium was completely detached. In the second set of homoplasts, degeneration was complete by the 8th day after grafting—that is, simultaneously with the first set. Detailed cytological study revealed a quantitative but no qualitative difference between the local cell reaction of blood and mesenchyme cells. No evidence of epithelial destruction by phagocytosis was found. The first anatomical sign of rejection of the homoplasts was a separation at the dermo-epidermal junction in the donor's graft. This is the point where a separation in healthy skin is so difficult to achieve. By dissection it is almost impossible. It can be achieved by autolysis, by digestion for 24 hours in 1% acetic acid and very neatly at times by electric shock. Once the grafts had separated, the epithelium, which is parasitic upon the dermis, began to degenerate from the deepest cells progressively outwards, and was finally cast off. The fate of collagen in the graft was less certain. At a very late date it was found in one patient to have been phagocytosed in small globules. In another it appeared to fade away.

The simultaneous rejection of the first and second set of homoplasts, which had previously been observed by Gibson in another case, provides one of the best pieces of evidence yet offered for the immunological explanation of failure of these grafts. It seems highly probable that the first set, grafted 15 days earlier, stimulated an antibody which was then available in the circulation to destroy the second at the same time. According to serological theory this antibody might be a lysin or variety of lysins; from the observations recorded, perhaps the dermo-epidermal junction is most readily, and collagen least readily, dissolved or broken up, thus accounting for the success of many corneal homografts. Only by following the progress of homoplasts by examination at frequent intervals from the earliest days can certain knowledge of their fate be obtained. Misleading impressions may otherwise arise. Even now many gaps in our knowledge remain and it is to be hoped that a few more human volunteers will be forthcoming to extend and confirm what has been found: It is important to know why more plasma cells, lymphocytes and polymorphs attend the homoplasts than the autoplasts; and whether, perhaps, these cells prepare the way for eventual ingestion of the collagen. Medawar has discussed other problems in a practical article.[2]

Though multiplication of cells is assumed Gibson and Medawar make no reference to cell division. Whereabouts in the graft are mitoses to be found, if at all? Or is the whole spread due to migration of cells? If mitotic division occurs within the graft at a distance from its migrating edge, as in the case of a wound, was any support found for the suggestion of Wigglesworth[3] that it was due to cell *sparseness* inside the expanding graft? Does the graft in fact function in just the same way as healing skin which has not been transplanted?

COUP AND CONTRECOUP

Surgeons have long taken a keen interest in the effects of injury to the head and have tried to explain what they have observed during life and after death; but the variety of these explanations bears witness to their foundation upon supposition rather than fact. Denny Brown and Ritchie Russell have supplied accurate information about the results of certain forces applied to the head when fixed or free to move under experimental conditions; the purely physical study of the behaviour of the skull and brain during and immediately after a blow remains to be worked out. Holbourn, whose study of the mechanics of head injuries appears on another page, starts from the known physical properties of skull and brain; using models consisting of a gelatin "brain" inside a paraffin-wax "skull" he has analysed the forces

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1. Gibson, T. and Medawar, P. B. *J. Anat.* 1943, 77, 299.
2. Medawar, P. B. *Bull. War Med.* 1943, 4, 1.
3. Wigglesworth, V. B. *J. exp. Biol.* 1937, 14,

which could result in cerebral injury. His main contention is that shearing strain—"the type of deformation which occurs in a pack of cards when it is deformed from a neat rectangular pile into an oblique-angled pile"—is the chief agent, and he proceeds to explain how this shear (or slide) may be developed in the brain as the result of blows upon the head.

Since the brain is incompressible, there is no appreciable relative movement between its parts as a result of linear acceleration; the notion that *coup* or *contrecoup* injuries are the result of alternate compression and rarefaction, due to free movement of the brain within the skull in the direction of the blow, must therefore be abandoned. A certain amount of shear may occur below the point of impact, particularly if the skull is broken, and this would account for *coup*. A much greater shear strain, however, develops as the result of rotation of the skull, and the fact that changes in rotational velocity are usually greater at the pole opposite to the point of impact would account for the more extensive injury of *contrecoup*. HOLBOURN's observations do not abolish *contrecoup*, if the word is used to mean merely polar contusion; but they do refute the notion that polar contusion is caused by movement of the brain in a straight line till it bumps on the far side of the skull, since they show that *contrecoup* is really the result of shear due to rotational injury.

It should be recognised that almost all blows on the head rotate it, and the damage done to the brain depends on how firmly it is gripped by the meninges and internal conformation of the skull. An attractive feature of HOLBOURN's presentation of the effects of shear is that it offers a clear mechanical explanation for the observations of DENNY BROWN and RITCHIE RUSSELL on cerebral concussion. Much remains to be discovered: what, for example, shear actually does to cerebral tissue; whether it affects cells or fibres or synapses; what it does to blood-vessels; and whether it can be a direct cause of contusion. Even as a simple extension of the experiments now described it would be important to know what happens when the forehead is struck, for we cannot accept the suggestion that, merely because rotation occurs in both cases, the effects are approximately the same as when the occiput is struck. Autopsies, of which there is unfortunately no lack, must not be neglected as a check upon laboratory experiments; for the damage done to the brain by a severe blow on the forehead is often most extensive at sites other than those affected by striking the back of the head.

WHAT KIND OF CORPORATION?

THE growth of public-utility corporations is one of the features of the twentieth-century British economic scene. In a timely review published in the last three issues of the *British Medical Journal* Mr. D. H. KITCHIN [1] points out that the public corporation or board embodies the principle that the best way to get a job done is to appoint capable and responsible people to do it and leave them as free as possible. The motive of successful and creative public service, he says, has proved quite as dynamic as the motive of private profit-making. This he considers not surprising, for much of the initiative and efficiency said to characterise private enterprise as opposed to official administration is provided by salaried workers who gain nothing material from their success.

An analysis of the constitutions of public corporations reveals two main types—those with boards built upon a representative basis, and those with appointed non-representative boards. Thus the Metropolitan Water Board is elected to represent the various local authorities concerned; the Port of London Authority is in part elected by ratepayers, wharfingers, and owners of river craft, and in part composed of appointed members representing the Admiralty, the Ministry of Transport, the London County Council, the City of London, and Trinity House; and the General Medical Council is partly elected by the profession and partly appointed to represent interested bodies. Two examples of non-representative boards are those of the British Broadcasting Corporation, appointed by the King in Council, and the London Passenger Transport Board, appointed by a group of trustees. Past experience has shown that where a board exists to perform functions that confer advantages on a number of bodies, there is much to be said for its being representative. If, however, its functions include the restriction of some bodies and the extension of others, for the common good, then a representative board is liable to find itself shot with dissension and reduced to impotence. In these circumstances, when a board is in effect a tribunal, its task is easier if it is non-representative.

Two types of corporate structure have been suggested for the national health service. Medical Planning Research [2] and now the British Medical Association [3] have proposed a national body, and the former specified that it should have a non-representative appointed board of governors, with representative advisory committees. In a special article a few months ago we put forward an alternative proposal for area corporate bodies, covering what we called health provinces.[4] These had governing councils representative of all hospital-owning authorities, health workers (including doctors) and local universities. If it wishes the medical services to be in the hands of corporate bodies, the profession will have to consider the relative merits of the different varieties—national and provincial, representative and appointed. Experience suggests that the structure should depend on the function they have to perform. We may suppose that a corporate health authority would have the following functions: first to employ doctors and their ancillaries (nurses, social workers, pharmacists, technicians, masseuses, dietitians, and hospital administrators), but not necessarily such personnel as clerks, porters, cooks, and cleaners; secondly to assess the health needs of the community and formulate plans to meet them; and thirdly to arrange that the plans are carried out. The chief means of securing execution of the plans would be to give or withhold financial grants for maintenance or extension: thus it would be necessary to reduce or even suppress the activities of some hospital-owning authorities, while increasing that of others. The first two functions—personnel and planning—could be performed equally well by elected representative bodies or by appointed non-representative bodies. But the ultimate success of a national health service will depend on the vigour with which the plans are executed. Once the question of suppression of redundant inefficient institutions arises, there is a danger that representative bodies will split into groups according to the interests they represent. For a national health service to become maximally efficient in a minimum of time, its governors should probably be an appointed national non-representative board. This argument, however, will not convert those who believe that in the long run democratic control at all levels gives greater efficiency than a more authoritarian machine.

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[1] *Brit. med. J.* 1943, ii, 369, 399, 423.

[2] *Lancet*, Nov. 21, 1942 (Suppl.). [3] *Ibid*, Oct. 2, 1943, p. 423. [4] *Ibid*, 1943, i, 813.

'FLU VACCINES UP THE NOSE

For some years F. M. Burnet has pointed out the theoretical advantages of immunising against influenza by spraying an attenuated but still living virus up the nose. In general, where live virus vaccines can be safely given they are more effective than killed ones; moreover, in an emergency it would not be difficult to produce in a hurry a lot of influenza vaccine of the necessary type. In Australia attempts have been made to test intranasal 'flu vaccines in the field.[1] Influenza viruses of three different strains were attenuated by amniotic passage in chick embryos and were administered by a de Vilbiss atomiser, each subject receiving 0·25 c.cm. Antibodies to the three virus strains were estimated, before and after the vaccination, by the Hirst test (inhibition of the agglutination of fowl red cells). About half those inoculated showed a rise in antibody titre against one or other virus—on the whole rather a poorer result than subcutaneous vaccination with inactivated influenza virus has produced here and in America. But it is urged that a virus given up the nose may produce antibody rise only in those in whom it can gain a foothold, in other words only in those susceptible persons whom we want to immunise; we do not care whether or not antibodies increase in the others, who are immune anyway. In support of this seductive argument it is recorded that when vaccinated people who had shown a good antibody rise to an influenza B vaccine were revaccinated 3 to 6 months later very few showed any further rise. No epidemic occurred among them to put their immunity to a real test.

One argument against the use of live, attenuated influenza vaccines is based on a fear that they might increase in virulence by passage from man to man. There was no evidence that this happened in the Australian trials, either in those conducted during an influenza season or in those after it; the trials involved "tens of thousands" of soldiers. Reactions produced by the intranasal vaccines were frequent but almost all slight, mostly amounting to slight headache, coryza or stuffiness for a day or two, not going on to the mucopurulent stage which so often follows a real cold. Among the soldiers no reactions were bad enough to interfere with training. It is suggested that these reactions were allergic, as they were commoner in those with an initially high antibody level than in those with a lower titre. They were also more in evidence after a second than after a primary vaccination; the possibility of sensitisation to the chick embryo fluids is not discussed.

There are virus-inactivating properties in human nasal secretions, and less certainly in tears, and these may have a great influence on liability to respiratory infection and response to intranasal vaccination. Francis and others[2] have lately found that the neutralising activity of nasal secretions rises after subcutaneous injection of inactivated influenza vaccines, and suggest that on this, rather than on a rise in circulating antibodies as such, depends any value possessed by such vaccination. Burnet now reports the surprising discovery that freshly isolated human influenza strains differ from laboratory-adapted ones in not being neutralised by human tears; he does not say whether nasal secretions also show up this difference. Other sharp differences between fresh and laboratory-trained strains were observed; we must therefore be more cautious than ever in applying conclusions from the laboratory to the field.

The Australian work is likely to be applied to the control of a pandemic rather than to the prevention of minor outbreaks such as we have had in recent years.

Annotations

TROPICS NOT SO UNHEALTHY IF—

A report[3] from the medical department of a commercial airline operating a service from Bathurst, West Africa, down the Coast to Lagos, thence inland through the Sudan to Egypt (a distance of almost 5000 miles) and finally to India, shows how knowledge can be used to prevent disease. The first 2000 miles took in the semi-jungle country of the West Coast of Africa where although the temperature rarely exceeded 90° F. the humidity was always high, the rainfall reaching in some parts 200 in. a year and the humidity in others not falling below 90% for several months on end. Crossing the African continent the temperature increased but humidity fell, until in the Sudan and Egypt real desert conditions were encountered with average maximum temperatures of 110–115° F. and wide diurnal variations of 60–80° F., while in the Persian Gulf temperatures reached as much as 127° F.

Candidates for service with the airline were carefully selected and the age-limits were set at 18–45 years. A full clinical examination was supplemented by blood-counts, serological tests and X-ray examination of the lungs. Som[illegible] cted, the chief [illegible] visual defects [illegible] seases (11%), and respiratory [illegible] having a history of repeated attacks of venereal disease, chronic alcoholism or peptic ulcer were also regarded as unsuitable types. Accepted applicants were inoculated against smallpox, the enteric fevers, tetanus, yellow fever and cholera, and were provided with mosquito nets, anti-mosquito clothing, a sun helmet, and a supply of quinine and mosquito-repellant before sailing. Of the men sent to Africa less than 3% returned for medical reasons and none of these was seriously incapacitated. In Africa, hospital-bed accommodation was provided for 10% of the personnel, but in fact 1% sufficed. In large stations a medical and surgical officer was provided for each 600 men, but a doctor was posted to each station even when the numbers there were small. Well-trained laboratory staffs an' adequately equipped hospitals with properly planned departments, including laundry services, played their part.

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1. Burnet, F. M. *Med. J. Aust.* 1943, 1, 385. Bull, D. R. and Burnet, F. M. *Ibid*, p. 389. Mawson, J. and Swan, C. *Ibid*, p. 394.
2. Francis, T. jun., Pearson, H. E., Sullivan, E. R. and Brown, P. M. *Amer. J. Hyg.* 1943, 37, 294.
3. *War Medicine*, 1943, 3, 484 and 619.

In West Africa, where malaria is rife, military statistics suggested that an attack-rate of 100% per annum, and in some parts even 200%, might be anticipated. However, apart from an outbreak in the first few weeks of hurried assembly—when 46 of 284 men were attacked, and almost 2000 days of work were lost by 300 men in 11 weeks—the malaria-rate proved extremely low. In September, 1942, there was only one case among 1400 employees and in October only 3 among 1800. This was attributed to the aggressive antimalarial measures applied at all the stations of the line. Besides the personal protective measures taken by the staff, all quarters and accommodation were screened and maintenance men were employed whose sole duties were to keep the screening in order. Antimosquito locks of adequate proportions were provided for all entrances, which were kept to the minimum, and all doors were fitted with automatic spring-closing devices. Quarters were sprayed daily and the adjacent native quarters were similarly treated. Oiling, dusting and drainage of potential breeding areas were also carried out and continuous maintenance gangs looked after these works; some 45 miles of ditches were dug in one station alone. Flying personnel had blood-examinations before every flight and the value of this was proven by the fact that in nearly every instance where positive smears were obtained the subject developed a clinical attack within 24 to 48 hours. In the treatment of the acute attacks various combinations of drugs were tried without any striking differences in the therapeutic results, and finally a routine course of quinine, gr. 30 daily for 2 days, followed by mepacrine hydrochloride, 0·3 g. daily for 5 days, was adopted. Almost all the infections were malignant tertian and it was not considered that anything was lost by the omission of pamaquin from the treatment. Quinine and mepacrine were used in suppressive treatment and no evidence was forthcoming that mepacrine diminished tolerance to altitude.

Gastro-intestinal diseases were next in frequency to malaria, and were well controlled by the screening of messes, kitchens and latrines against flies. Before this was done some 20% of the personnel at one station contracted diarrhœa once or twice a month; and in another station the rate fell from 30% to 0 on the installation of flush toilets and the screening of quarters and kitchens. The importance of periodic examinations of all native food handlers was shown by the fact that 28% of the natives were found to be carriers of *E. histolytica*.

Psychiatric problems, often stressed as a cause of trouble in the tropics, were found to be relatively unimportant; but all the personnel were volunteers and their living conditions and food were unusually good. Surgery presented no special difficulties and sepsis was not more common than in temperate regions. The medical staff was convinced that the climate as such had no deleterious effect on health and it was the unanimous opinion that good health can be maintained in the tropics provided preventive measures against disease are aggressively applied.

SENSITIVITY TO PAIN

PAIN is difficult to assess, and the word " sensitivity " is itself ambiguous, for both the man who feels little pain and the one who feels the pain but bears it stoically may be called insensitive. Sherman[1] refrains from a definition, and waits for his patient to " wince, change expression, or cry out," in response to a gradually increasing painful stimulus. His instrument of torture (Hollander's method) is a metal grater, with the business surface in contact with the subject's arm, on which it is pressed by an inflated sphygmomanometer cuff. The pressure at which the victim reacts spontaneously is taken as a measure of his threshold to pain, and he is accordingly classed as hypersensitive, hyposensitive or normal. In spite of the errors likely to be involved in both the stimulus and the reading of the response, any well-marked difference between large groups of patients examined by the same investigator is probably significant. In two series, each of 130 patients, one group with organic and one with functional disease, Sherman finds practically the same proportion of hyposensitive persons (16–17%), while only 6% of patients with organic disease, as against 30% with functional, are hypersensitive. The results are confused by a sex difference, 75% of all the hypersensitive cases being women and 90% of the hyposensitive men, a finding possibly indicating only that women are more thin-skinned than men. The fact that 34% of the hypersensitive cases are under 20 years of age may be open to a similar interpretation. Corroboration by Libman's test of pressure on the styloid process can scarcely be accepted, since there is no way of measuring the intensity of the stimulus. The difference between patients with functional and organic disease seems the most reliable finding, and is rounded off by the study of a group of 150 exceptionally hardy men (coal-miners) who treated even organic disease with contempt. None of them was hypersensitive, and 75% were hyposensitive. A similar distribution of sensitivity in a group of Indians suggests that indifference to pain may be inherited. An investigation of this kind is worth repeating with more precise methods. Routine clinical testing is one thing, but research to establish a principle is another. These results merely extend those of Wilder,[2] who used the same method. An electrical stimulator described by Knowlton and Gross[3] for studying analgesics in dogs would be little more troublesome to apply, but is quantitative, avoids the mixture of sensations which must accompany the gradually increasing pressure of the grater in the sphygmomanometer cuff, and allows of a rest between the increasing stimuli, thus eliminating the adaptation of the pain endings which must occur with a continuous stimulus. Repeated testing of the same individual on different days should also be done, because Knowlton and Gross found a certain variation of threshold in their dogs. They used a slight widening of the eyelids as indicative of the first response to pain, and it is possible that in man some such consistent index could be found. From the clinical standpoint, Sherman's findings are useful confirmation of a general impression, but if they were further substantiated they might lead to a reliable test for helping to distinguish between functional and organic disorder.

TREATMENT OF METHÆMOGLOBINÆMIA

METHÆMOGLOBIN in the blood has been classically associated with hæmolytic diseases, certain poisons, and enterogenous cyanosis. We now know that in hæmolytic diseases the pigment is methæmalbumin, but the other two are definitely methæmoglobinæmias, and the distinction is easily made if one remembers that in hæmolytic diseases the pigment is in the blood plasma whereas in the others it is confined to the red blood-cell. There is one other very rare form of true methæmoglobinæmia; this is one of the " inborn errors of metabolism " and the victims have a varying proportion of their blood hæmoglobin in that form. They suffer no disability, since the total blood-pigment is usually increased so that the normal amount of oxyhæmoglobin is available, but the presence of the methæmoglobin gives them a slaty-blue colour that is ugly, often exposes them to unnecessary investigation, and causes alarm. This disease is so unusual that it might well remain buried in the literature, but it now appears that it can be treated. At a meeting of the Royal Academy of Medicine in Ireland on May 7, J. Deeny, H. Barcroft and D. C. Harrison described two brothers with this condition;

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man, E. D. *Canad. med. Ass. J.* 1943, 48, 437.

[2] Wilder, R. M., jun. *Proc. Mayo Clin.* 1940, 15, 551.

[3] Knowlton, G. C. and Gross, E. G. *J. Pharmacol.* 1943, 78, 93.

both had slate-coloured faces and hands, but, like other cases, their general health was good, although both had about half of their total blood-pigments in the form of methæmoglobin. In 1930 French workers showed that ascorbic acid has a favourable effect on this disease; Deeny and his colleagues confirmed this—in one case a daily intravenous dose of 100 mg. of ascorbic acid reduced the methæmoglobin from 43% to 6% of the total blood-pigments in a month; there was a simultaneous reduction in the total blood-pigment and in the red-cell count. The ascorbic acid appears to act by converting the methæmoglobin to ordinary hæmoglobin. It will be interesting to see if the same treatment can be applied successfully to other forms of methæmoglobinæmia, especially that due to drugs.

CORNEAL GRAFTING

If an eye is to see, the central three millimetres of cornea must remain transparent; a dense scar in this area will blind an otherwise normal eye. Opacities from corneal ulcers, interstitial keratitis, ophthalmia neonatorum, and wounds or burns of all kinds have condemned many patients to permanent blindness, so it is not surprising that surgeons have tried to graft clear cornea on scarred eyes for over 100 years. Even before that, the problem of the leucomatous eye was stirring the mind of Robert Mead,[1] who in 1775 suggested putting equal parts of powdered glass and sugar, "levigated into an impalpable powder," into the eye every day; this, he wrote, "gradually absterges and wears off the spot by its inciting quality." Reisinger[2] was the first to attempt corneal transplantation, for in 1818 he replaced the cornea of one animal with that of another, and at the end of twenty days half of it remained transparent. In 1838 Kissam transplanted the cornea of a six-months old pig to a human eye, but though vision improved immediately after the operation the graft later became opaque. Similar operations were tried by other surgeons but the graft never remained transparent for long, and it is now established that all grafts of animal cornea to man are doomed to failure.

The possibilities of the operation were revived in the '70s by A. von Hippel,[3] who invented a trephine which simplified the procedure and was the first surgeon to transplant from one human being to another a portion of cornea which remained permanently transparent. Using von Hippel's trephine, Zirm[4] reported an exceptionally successful case in 1906, the donor being a boy of 11 whose eye had been lost by injury. From perception of hand movement only, his patient's vision improved to 6/36 more than a year after operation, proving that under certain conditions the operation could be a sight-saving one. Isolated reports continued to appear, but no series from which the success of the operation could

Ascher (1919–22) from

chnig[5] himself (1930),

operations performed

afts used were whole thickness of cornea, circular and 4–5 mm. in diameter. They were taken from an eye which had had to be removed from another patient, or from an eye enucleated shortly after death. Elschnig found that the graft will be successful in 22% of patients who give no evidence of increase of ocular tension, but that if only the patients suffering from interstitial keratitis are considered the results will be much better than this. W. P. Filatov[6] in Odessa has performed more of these operations than any other surgeon. Up to the end of 1938 he and his school had done 537 transplants. He made several modifications in the operation, but more important than these was his discovery that for transplantation the cornea from a cadaver is at least as good as, if not better than, that removed from a live eye. The eye from which the graft was to be taken was removed up to 24 hours after death and kept at 2–4° C. for from one to eight days. In his series, using cadaveric material, 146 transparent grafts were obtained in 366 cases—40%. The donor's blood was always tested for syphilis, but the blood-group of the donor has no bearing on the chance of a successful operation. Von Hippel noticed that in a successful case the recipient's cornea immediately adjacent to the graft increases in transparency, perhaps because of the increased blood-supply to the cornea necessary to keep the new graft alive, so Filatov has tried grafting the peripheral part of a leucomatous cornea and the centre of the cornea has tended to clear; no precise records of these cases are available yet. In America Castroviejo[7] and his associates at the Columbia Presbyterian medical centre have performed more than 100 corneal grafts. In favourable eyes he says that 85% success may be expected and in 2 cases vision improved from hand movements at one foot to 6/6. In this country Tudor Thomas[8] has done the pioneer work and reported 36 operations by 1937; he says that the graft remains transparent in 86% of favourable cases. Now Leahey[9] who used Castroviejo's twin knives, has published his results in 10 patients. All were improved and several could read book print, the best distant vision being 6/24.

Corneal transplantation, then, has established itself as a practical proposition, and under certain circumstances a high percentage of success can be expected. For good results the ocular tension should be normal and the graft should have areas of semitransparent cornea adjacent to it; because of this and of the ghost vessels already present in the cornea the best results are achieved in interstitial keratitis. There is no doubt that grafting will rescue some of the many eyes blinded in this war by burns and scars of the cornea.

PHENOTHIAZINE UNSUITABLE FOR TREATING THREADWORMS

Phenothiazine was first tried in the treatment of threadworms by Manson-Bahr.[10] In an investigation its pharmacology de Eds, Stockton and Thomas[11] had viously recorded an anæmia in 3 patients out of 10 w were being given the drug as a urinary antiseptic, a similar report came from Hubble,[12] who saw 3 cases anæmia among 30 children treated. Doubts about employment of phenothiazine were justified by the from acute hæmolytic anæmia of a child aged 6 who been given 8·5 grammes,[13] and two further instances severe hæmolytic anæmia following its use have bee reported by Johnstone[14] in this country and by Grant in Australia. The opinion that it is valuable agai threadworms has been qualified by this evidence into general distrust of its toxicity in children. Vet experience has also been that, while it is a reasonal safe anthelmintic for adult animals, it is dangerous young ones, especially pigs.[16] If any therapist n further dissuasion from its use, this is provided in report by Bercovitz, Page and de Beer,[17] who not onl confirm the accounts of its toxicity published in th

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1. Medical Works of Robert Mead, Edinburgh, 1775, p. 410.
2. I, part 1, p. 207.
3.
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6. *Lancet*, 1937, i, 1305. Modern Trends in Ophthalmology, Ridley and Sorsby London, 1940, p. 582.
7. Spaeth's Principles and Practice of Ophthalmic Surgery, adelphia, 1939.
8. Thomas, J. W. T. *Brit. med. J.* 1937, i, 114.
9. Leahey, B. D. *New Engl. J. Med.* 1943, 228, 337.
10. ii, 808.
11. d Thomas, J. O. *J. Ph*
12. 0.
13. i, 39.
14. *J.* 1942, i, 259.
15. 1943, ii, 27.
16. *M. Vet.* 412,
17. de Beer.

country but also show that, in doses well above the danger level for children, it is not effective against the threadworm (*Oxyuris vermicularis*). Of 10 patients they treated 8 failed to give the three negative swabs regarded as necessary to establish a cure.

Fortunately there is no need to lament the departure of phenothiazine, for its place in the treatment of threadworms has been taken by gentian-violet which is given in coated capsules of grain $\frac{1}{6}$. The dose is one capsule a day for each year of age up to six years, and this dose is continued for a week. A second course may be given after an interval if worms are seen in the fæces or ova are still discovered on the swabs. With these doses no toxic effects have been recorded. Wright and Brady[18] obtained 60–90% cures by its use in adults and children, and subsequent clinical experience rates its efficiency more highly still.

FERTILITY AS A CONTROLLABLE FACTOR

JUST now population trends are exciting the opposite-minded to argument—some saying let us have more of one kind of men and others saying let us have less of every kind. Across the controversy the statement of experts convened by the British Social Hygiene Council breathes like a voice from the laboratory. Whatever we think about man, few of us want to picture him as a dying race; and whether we want to extend fertility or reduce it we should prefer not to have the issue taken out of our hands by biological failure. The experts produce evidence (see p. 457) of involuntary impaired fertility in the population which is striking. Experience has shown that in many cases the reproductive function can be restored or improved. Since devices for reducing fertility have stimulated investigators, and are now becoming reliable, treatment for improving it should excite at least equal interest. The plea for better facilities for skilled diagnosis and treatment of all grades of infecundity is sensible and timely.

SERUM REPLACEMENT IN BURNS

THE most profound change that can be demonstrated in the blood of a burnt patient is loss of protein and water. When serum and plasma transfusion was made available some years ago there seemed to be a good chance of saving the lives of those whose burns extended beyond the critical one-third of the total body surface. Unfortunately these hopes were not always realised and it seemed possible that other factors were of greater importance than simple plasma loss. Presman and his associates[19] however believe that the failure of intravenous serum therapy has been due to the use of insufficient quantities. They refer to the work of Elkinton, Wolff and Lee,[20] who maintain that damaged capillaries do not regain their normal permeability (and will therefore go on leaking plasma) for up to 40 hours after a burn. During this time not only must the normal bodily requirements be met, but any loss must be continually made good if a fatal reduction of blood-volume is to be avoided. They cite two cases in which 45% and 50% of the body surface had been burnt and whose hæmoglobin, protein, non-protein nitrogen and hæmatocrit values were recorded during treatment. An estimation of the blood and plasma volume was made from the body weight. Each patient received 4250 c.cm. of serum luring the 68 hours following the burn, 1750 c.cm. being given during the first four hours. In addition other fluids were given by mouth and vein, so that one patient took no less than 19,970 c.cm. of fluid during the 68 hours after the burn—that is, 7000 c.cm. in excess of normal requirement in 24 hours. As a result, it is said, of these heroic measures, both patients made uninterrupted recoveries. Unfortunately the parsimonious equipment of many hospitals precludes any attempt at accurately controlled treatment on these lines; and indeed where the patient may have been anæmic before sustaining the burn any attempt to maintain a *normal* hæmatocrit value might meet with disaster. Presman and his colleagues therefore conclude with a simple rule to follow in the treatment of severe burns. They recommend that 50 c.cm. of serum should be given into a vein immediately for every 1% of body surface which has been burned, with an additional 20–30 c.cm. for every 1% during the first 24 hours and another 20–30 c.cm. in the first 72 hours following the burn, thus totalling 100–110 c.cm. for each 1% of body surface burnt. These recommendations may be summarised as follows:—

	Volume of serum to be given for each 1% of burnt surface.
Immediately	50 c.cm.
During first 24 hours ..	20–30 c.cm. } in addition.
During first 72 hours ..	20–30 c.cm. } in addition.

They state further that no crystalloid fluid should be given during the first 24 hours, but that fluids and a high-protein diet by mouth should begin as soon as possible. It is to be hoped that others will have the same measure of success with their method.

THE LAST OF DR. THORNDYKE

Dr. Austin Freeman, whose death is announced on another page, gave more pleasure to his colleagues, in his time, than perhaps is usual in our profession. If Conan Doyle set the standard for scientific crime investigators, Austin Freeman, in his stories of Dr. John Thorndyke, has carried on the Holmes tradition scrupulously. Like Holmes, Thorndyke is credibly—but only just credibly—well informed; he has the same passion for accuracy, the same meticulous attention to detail coupled with a considerably greater knowledge of laboratory technique, and an equal disregard for the lure of matrimony. He lacks Holmes's more spectacular and endearing side, perhaps: no opium, no violin and no situations contrived for theatrical effect find their way into Thorndyke's well-regulated life. Here is a serious-minded scientist, and the reader is expected to get his fun out of the hard labour of detecting, not out of the foibles of the detective. He does, too. Whether helping Dr. Thorndyke to look into the manners and customs of marine worms, or breathing down his neck while he examines (for arsenic) a lock of hair from a long-dead girl, the reader gets his ration of interest and excitement; and he is blessed with an encyclopædic mind who puts down an Austin Freeman without having learned some odd new fact or other. Doctors, many of whom are martyrs to detective literature, nearly always enjoy the details of medical jurisprudence which Thorndyke had at his finger tips. It is perhaps a measure of Freeman's skill that he often dispensed with surprise in his puzzles; he could tell his story backwards—beginning with the culprit and working through the steps by which he was undone—without losing his reader's attention.

ROYAL COLLEGE OF PHYSICIANS OF LONDON.—On Monday, Oct. 18, at 2.30 PM, Dr. W. E. Hume will deliver the Harveian oration.

ROYAL SOCIETY OF MEDICINE.—On Tuesday, Oct. 12, at 5 PM, Dr. W. Norwood East will deliver his presidential address to the section of psychiatry on the state, the criminal and the psychiatrist. Mr. Malcolm Donaldson will give his presidential address to the section of obstetrics and gynæcology on Oct. 15, at 3.30 PM. He will speak on the cancer problem from the point of view of the young gynæcologist and a discussion will follow. There will also be a discussion after Dr. N. S. Finzi's presidential address to the section of radiology at 4.45 PM on the same day. The subject is to be impending new developments in radiotherapy.

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8. Wright, W. H. and Brady, F. J. *Ibid.* 1940, 114, 861.
9. Presman, D. L., Janota, M., Weston, R. E., Levinson, S. O. and Necheles, H. *J. Amer. med. Ass.* 1943, 122, 924.
0. Elkinton, J. R., Wolff, W. A., and Lee, W. E. *Ann. Surg.* 1940, 112, 150.

Special Articles

CARE OF THE CHRONIC SICK

LETITIA FAIRFIELD, CBE, MD, DPH

PROBLEMS raised by chronic sickness are important but have been neglected in most schemes for medical reorganisation. Chronic sick patients are numerous, especially in the higher age-groups, and their long occupancy of beds holds up a high percentage of the total accommodation. From the administrative point of view they overlap with the crippled or "physically handicapped" and in the upper ages with the "aged and infirm." Hence the total numbers cannot be exactly estimated, but the extent of the problem may be partly gauged by the London figures.

Chronic sick in London	*August 1939*	*March 1943*
(a) In public health chronic sick establishments	3818	2314
(b) In acute general LCC hospitals ..	1400	1600
(c) In social welfare institutions..	416	35
Total	5634 ..	3949

(The numbers in March, 1943, were reduced by evacuation)

In addition about 35 chronic sick are maintained in voluntary institutions by the London County Council and a considerable number (who cannot, however, be separated statistically from the aged and infirm), are living at home on out-relief. The number of chronic sick not maintained or assisted out of public funds is even more difficult to ascertain but must be considerable. For every category there is a serious need for paying accommodation to meet different grades of income.

(A) PREVENTION

Every advance in medicine and surgery brings some reduction in the number of permanent invalids, and good national planning bringing the best medical skill within the reach of all, will presumably also reduce the numbers of chronic sick; the impending increase in the average age of the population, however, will keep up the *relative* proportion of chronic invalids. Of recent years, the improved care of surgical tuberculosis, of anterior poliomyelitis, and rheumatic heart disease has enormously reduc
among the you
treatment of
have a similar
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should also have a slow bu
numbers to be provided fo
fore that the chronic sick
are the irreducible minim
persons incapable of self-maintenance and requiring permanent medical supervision and usually some degree of nursing care.

(B) CLASSIFICATION

Classification is not easy because the patients cover all ages, an immense range of diseases and wide differences of mental capacity. Their needs, whether physical or mental, are not all the same. Any system of grouping should therefore take into account: (1) age; (2) degree and nature of disability (e.g., bedridden or ambulant); and (3) mental capacity and temperament.

(1) *Age.*—Experience has shown that the chronic sick may conveniently be divided into four age periods:

(*a*) Children under 16. Most children who require long hospital care may now be considered as long-term treatment cases rather than chronic sick, but a few unimprovable or deteriorating cases remain. They include disabling congenital

than 25 children, though cases were received from outside London in addition. A teacher was provided by the education officer and the children had access to a garden. The unit though an improvement on their previous surroundings was never a complete success. The children's diverse ages and intelligence levels made t
almost impossible, while
and unproductive of re
unit had to be broken up and the children were distributed among the long term orthopædic and rheumatic cases at Queen Mary' e and
disability. No
staff has to njoy
contacts with more normal children and the wider range of interests found at Carshalton. Probably the cost per head is no greater than when they were segregated in a special unit.

(*b*) Adolescents and young adults. These patients resemble the group under 16 from the medical point of view, and many of them have in fact spent many years under treatment in children's hospitals. Some are in the terminal phases of fatal disease, others have years of life ahead. In some ways they are more difficult to provide for than the children as they have more insight into their fate. They must be as fully occupied, body and mind, as their condition allows, and they need

earn a few shillings a week with some benefit to their pockets and immense benefit to their self-respect. They feel they can do something for somebody, which is almost a definition of life as opposed to stagnation. The upper limit of this young adult group need not be too strictly drawn but it has been found from experience that the young incurables do greatly enjoy each other's company and separation from the more depressing older invalids.

(*c*) Older but mentally alert adults. These are mostly the victims of arthritis or disseminated sclerosis or chronic heart or lung disease. They are usually past the training stage but are capable of carrying out simple needlework or handicrafts, and they enjoy wireless, visiting and books, and the amenities of life they have been accustomed to. It is important to keep them apart from the senile group and from constant association with the dying.

(*d*) The mentally deteriorated and senile. A large proportion of the chronic sick are of advanced age and others are suffering from some disease such as cerebral thrombosis which has impaired their mental faculties. These old people's requirements naturally vary with their physical condition and social background, but a great number seem well satisfied with a little knitting, some wireless, sufficient food and warmth. They greatly value visits from relatives or old friends, but the advances of strangers, however well-meaning, are apt to meet with a poor response. As a ward sister recently remarked to me, "They live in the past and take less interest in present contacts than one would think."

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explored already, it is advisable to arrange for complete overhaul in a fully equipped acute hospital. An
he amount of incapacity,
and the need for pallia-
ge. If the question of training for a trade or admission to a sheltered workshop arises, the doctor
of the problems
capped. Lack of
deplorable errors in disposal, as for example, patients with minor or improvable defects being cast unnecessarily into the stagnant pool of a workhouse ward, while others with progressive paralysis or advanced heart-disease may be sent for expensive trade training.

Medical supervision of all chronic sick though not necessarily continuous should be careful and efficient, the patient being kept at his maximum of physical efficiency and comfort At
the same
massage or
avoided.
improvement has taken place or no intercurrent disease has developed.

For the bedridden good nursing is essential, and these patients afford excellent nursing training The question of nursing the chronic sick remains the subject of controversy. It is becoming generally recognised now that the ordinary nurse in her training should learn something of their care, but it does not follow that the highly qualified "trained nurse" is the best person to staff chronic sick wards. In the opinion of many superintendents, the assistant nurse comes much nearer the ideal for this purpose. Some women (not always the best examinees) have a special vocation for chronics and the aged, as others have for children, and well-organised schemes will endeavour to make full use of this fact and to give these nurses an honourable place in the profession.

3. *Mental capacity and temperament.*—Wise planning for the chronic sick entails the estimation of their mental condition and temperament. The psychotic and the mentally defective should be dealt with as such, under the ample legal provision made for them, and should on no account be mixed with chronic sick patients of normal mentality. This is a matter of much greater importance to the patients, who have to live at close quarters with each other, than to the staff. Any scheme should also include some machinery for classifying and segregating senile dements, who are apt to be intolerably noisy and offensive neighbours. In London it has been customary for many years to transfer such senile patients without certification to a separate institution.

Where training schemes are contemplated, an exact estimate of the patient's intelligence becomes important and an intelligence test should be applied by an expert. The casual observer is most likely to go wrong in dealing with spastic, athetotic or hydrocephalic cases. The common tendency is to *under*estimate the mentality at first sight, then to *over*estimate it and to form much too hopeful a view of trainability, with inevitable disappointment.

(C) DISPOSAL

The alternatives before those who have to provide for the chronic sick are :—

(*a*) Home care by relatives or guardians.
(*b*) Voluntary homes.
(*c*) Special wards or departments in acute general hospitals, voluntary or municipal.
(*d*) Special municipal hospitals.

(*a*) *Home care* is, in the opinion of many experienced doctors, nurses and social workers, the method of choice.

That this feeling still prevails among the public was shown by the fact that on the morning after air-raids began again in the spring of 1943, 68 chronic sick persons were sent in to one LCC hospital in South London. The relatives were willing and anxious to look after them under normal conditions but could not get them into air-raid shelters. It is an indication of decent feeling in a community that people should want to look after their helpless relatives and chronic invalids, who on their part are usually happiest at home. There they can obtain emotional satisfactions which few institutions can give and they can find useful natural outlets for their energies in place of work expensively devised for them. Friendly visiting by philanthropic organisations can often be arranged, and the Boy Scouts and Girl Guides have excellent schemes for keeping in touch with bedridden young people. The chief obstacles in the way of family care for chronic invalids are : (1) inability to undertake the nursing (here good district nursing associations can help, and should always be in the forefront in the care for the chronic sick) ; (2) inability to maintain a "bouche inutile." Here a sympathetic and constructive attitude on the part of the public assistance authorities is all important. The Poor Law Act, section 14, is almost the only statutory expression of family responsibility now remaining. Outdoor relief is a real economy if it prevents unnecessary institution or hospital admissions. It should recognise generously the invalid's special needs—for example, extra nourishment and surgical appliances. The new Act of 1943 enables larger money allowances to be given and if the Beveridge report materialises, these benefits will all come under the heading of security assistance and not of public assistance.

In many cases even if nursing and financial help are available the invalid puts an excessive strain on family resources—or there may be no relatives. The alternative of boarding-out with strangers is theoretically possible but in practice it rarely works well with the chronic sick. Few conscientious people are willing to undertake the responsibility of invalids not related by blood, and the authorities naturally have to guard against the unscrupulous who would only too willingly exploit the helpless for gain. In a large number of cases, therefore, institutional care of some kind is inevitable.

(*b*) *Voluntary homes.*—In making the voluntary home the second method of choice, I am using the accumulated experience of officers in the Public Health and Social Welfare Departments over 13 years. These homes are preferred by most of the younger patients. They offer a freedom from restrictions, a sense of independence and homeliness, which the larger institution cannot reproduce. Often, too, the staff have a special sense of vocation and the atmosphere is coloured by their religious beliefs in a way helpful to patients. Voluntary homes now available vary from small and shabby establishments with a dozen beds, run by a pious old nurse, to large specially built hospitals such as the Anglican homes at Woking and St. Peter's, Kilburn, and the Catholic home at St. Joseph's, Edmonton. Most of these homes provide handicraft instruction ; they give the women and men opportunities for shopping and visiting neighbouring places of entertainment, and some have facilities for massage and light therapy. The most valued feature of the voluntary home is the freedom with outside contacts it allows and the liberty given to the patients to keep their own small possessions round them and to wear their own clothes.

Voluntary homes for chronic sick are usually—but not always—registered as nursing-homes and should be carefully and strictly inspected. Not only the small ones run for profit but the large establishments of famous religious orders have dangerous potentialities. Their cardinal faults are overcrowding, understaffing, and the admission of mental and senile patients who annoy others.

I have known a paralysed man not washed all over for three months, a paralysed woman left to starve on a few sips of milk a day because no food chart was kept, an advanced cardiac case terrified by a senile dement who was allowed to wander into her room with a knife. All these incidents took place in well-known institutions, but they all should have been prevented by adequate inspection and strict insistence on rules. An important point is that patients should not be sent beyond reasonable distance from the area of the local authority maintaining them (about 50 miles is roughly our limit in London). They can be visited and inspected from time to time and recalled to hospitals of the responsible authority for overhaul and treatment if necessary. Town planning schemes should take into account the need for these small homes and hostels when framing regulations for zoning.

Chronic sick patients maintained in voluntary homes should be carefully selected and some trouble taken to allocate them to the right type of home. The following classes of patients will be found unsuitable and should be otherwise accommodated :—

1. Those requiring heavy nursing—unless the responsible authority is convinced that an adequate supply of skilled nurses is *continuously* available in the voluntary home.

2. Those with disabilities offensive to other patients at close quarters (incontinence, unsightly skin diseases, persistent sinuses).

3. Patients of quarrelsome or neurotic temperaments. If efforts to adjust these patients to their surroundings fail and they persist in creating an atmosphere of misery around them, they should be brought into a large institution where they can do less harm. Repeated attempts at placement mean mistaken philanthropy.

4. Mentally deteriorated patients.

Even before the war there were far too few voluntary homes for women and hardly any for men. The practical difficulty confronting these voluntary homes is that the turnover is so slow that subscribers lose interest, and they are hard to maintain. The few large well-endowed chronic hospitals are difficult of access and rarely have vacancies. A few "homes for the dying" exist, which perform a most valuable function in the last phases of disease. Their number could probably be greatly extended if an appeal was made to religious bodies for this kind of service. The present cost of these homes is up to £2 5*s*. per bed per week. The maintenance is much cheaper than in public institutions, and gives happier results.

(*c*) *Special wards in acute general hospitals.*—The treatment of the chronic sick has been consistently unpopular with both the medical and nursing professions. The voluntary hospitals, great and small, would have little to do with them and the honour of making the necessary and humane provision has therefore been almost exclusively that of the municipal hospital.

[illegible] fo[illegible] le[illegible] m[illegible] of case which they very commonly meet in general practice. The chronic sick have suffered from this ostracism too, for a tradition of hopelessness and inertia has grown up around their problems, and undoubtedly much that could make their lives brighter and reduce their numbers has been omitted.

For the future it has been suggested that all general hospitals, including the great teaching hospitals, should be compelled to reserve at least 10% of their accommodation for chronic sick.

As the turnover would be slow, it might be advisable to reserve these wards for specially selected types of chronic sick—for instance, terminal phases of fatal disease, patients with chronic conditions requiring treatment or on whom new methods of treatment could be tried, patients needing an overhaul or full examination before transfer to another institution. It might be thought advisable to limit the stay in these chronic wards to 6 months as a general rule. It should be clear that these wards, to be any use, must be in the main hospital; dumping the patients in a country branch miles from their friends would be no solution.

DISCUSSION

Even after all suitable cases had been placed in voluntary homes and the voluntary hospitals have taken a 10% quota the bulk of the chronic sick will remain for the municipal hospitals to dispose of. The first important change required is improved classification. In this, many hospitals have admittedly failed largely owing to the fact that the accommodation has never kept up with the demand.

A beginning has however been made. We have had 10 years' experience of an adolescent chronic sick male unit for 25 lads and men at Queen Mary's Hospital at Sidcup, which is an outstanding success. A handicraft instructor was secured who created interest and enthusiasm in his workers. Being [illegible] in the middle of a convalescent hospital was a daring experiment, but has proved a success largely owing to the personal enthusiasm of the staff and the fact that the proportion of chronic sick has been kept small. A similar unit for young women is being developed at another LCC hospital.

Of the remaining chronic sick, the younger and more mentally alert should be gathered in the better type of ward at the disposal of local authorities. Sun balconies should be provided where there is no access to gardens. Some of the wards should be divided into bays or cubicles by partitions to give more privacy. The patient's previous social background largely determines whether he prefers privacy or sociability. Many Londoners are wretched in small rooms.

The most desirable move, however, would be to allow the patients to have a small space around them for their family po[illegible] Even a lo[illegible] make the[illegible] an indign[illegible] in fact the idea. It is the only home these poor creatures will ever know. The possibility of combining such accommodation with a sheltered workshop where a simple trade could be carried on is being explored.

The senile and mentally deteriorated are probably quite as happily placed in their long open wards, with a day-room annexe, as they could be anywhere. For them the most important factor is to be near relatives whom they remember, for contact with strangers is no particular pleasure to them. Small dietary changes and treats, such as cakes and sweets, are almost their only other pleasures.

How far the chronic sick in municipal hospitals should be gathered into separate institutions, or how far accommodated in special blocks or wards in general hospitals, is a difficult question. It will depend largely on the accommodation at the disposal of the authorities. If t[illegible] not[illegible] ma[illegible] like to work in a big hospital devoted solely to the senile and incurable and the number of such establishments should be reduced to a minimum. Wards or departments f[illegible] search units, say dealing [illegible] well be combined with ch[illegible]

Whatever method of disposal is adopted, all grades of chronic sick should have ample and varied food, warmth, cleanliness, and devoted and skilled nursing according to their needs. Equally important is full occupation for body and mind up to the limit of their capacity.

STERILITY AND IMPAIRED FERTILITY

CONCLUSIONS AT A CONFERENCE CONVENED BY THE BRITISH SOCIAL HYGIENE COUNCIL *

THE official census data do not yield any direct [illegible] frequency of sterility (child-[illegible] (small number of children). [illegible] this field springs from the general experience and the specific efforts of individual workers—mostly clinicians interested in the treatment of involuntary sterility. The following summary reflects the views formed by British and American investigators.

About a tenth of all marriages remain childless. It has not been suggested that there are class differences which would reveal themselves without specific statistical investigations. Childless marriages among working-class patients are common.

Permanent childlessness is rarely deliberate. This conclusion is based on the experience of medical practitioners and on specific investigations. Thus inquiries were made among industrial workers in order to ascertain how many of the married but barren women were deliberately childless. This inquiry was conducted by a doctor who interviewed personally every woman; and the inquiry was appropriate since the childless women numbered up to 18% of g[illegible] women each) questioned. [illegible] inquired into the history of [illegible] families who had not applied for advice. It appears that in about 90% of childless couples who have been married for at least 5 years the absence of children was caused by impaired reproductive power (low fecundity).

Furthermore, such inquiries among patients who did not request advice for sterility show that in at least 60% of one-child coup[illegible] married for more than [illegible] either desired or not [illegible] experience extending to many hundreds of cases and investigations among working and middle-class women indicate that the small family (two children) is also often due to low fecundity and that fecundity tends to fall after the first or second confinement.

Data collected by individual clinicians and extending to over 4000 cases and by clinics show that birth control although applied at times by the great majority of the population is rarely (in about 5% of young couples) intended to procure permanent barrenness. Furthermore, effective methods of birth control are usually sought among the working class only by women who have had one or more children. One of the statistical expressions of this fact is that in one group (numbering more than 200 women) of regular users of birth control the average number of children was higher than in a comparable group of women using the same methods intermittently. Further investigations show that the contraceptive methods most commonly used by the industrial population are notoriously unreliable (coitus interruptus or soluble pessaries); their seeming success to which many working-class women attribute the small size of their families (e.g. 3 children in 15 years of marriage) can be shown to reflect lowered fecundity in at least a third of the cases (about 100) investigated.

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* Members of t[illegible] atement were Dr. V. B. Green-Arm[illegible] of. F. J. Browne, FRCOG; Mr. R. [illegible] a Gladys Dodds, FRCOG; Dr. Gre[illegible] e. Clare Harvey, ARCS; Dr. Marg[illegible] L. W. Johnstone, FRCOG; Prof. W. [illegible]-Roberts, FRCOG; Dr. A. Sharman; [illegible] FRCS; Mr. B. P. Wiesner, PHD; [illegible]

Considering all available information it seems that in 60–90% of all barren and one-child couples lowered fecundity (depending on involuntary factors) is involved. Lowered fecundity is also often found in couples with 2 or more children. But its practical significance is less than in the one-child families because the use of effective methods of birth control increases with the size of the family. This widespread infecundity of the population is due in part to low female fecundity; particularly to conditions which tend to develop after confinements or miscarriages. But low reproductive power in men is very common; about 60% of husbands of childless women are either incapable of producing offspring or fail to attain a level of fecundity which would make conception easy (data from about 2000 cases, and from American findings). Similarly the husbands in one-child families are often of low fecundity. Examinations of about 100 volunteers (medical university students and professional men) confirms the view that average male fecundity is much lower than is commonly assumed. It appears to be definitely impaired in at least 1 out of 5 men examined. The men examined were mostly in good general health.

Nearly 90% of the middle-aged childless women (i.e. the last generation of married women) of the industrial groups interrogated in inquiries had accepted their fate without seeking specific help from any doctor or clinic. The remaining women sought advice; but in less than 5% was adequate or even relevant advice given. Middle-class women seek advice much more often. In the great majority of cases examinations and advice still tend to be limited to the wife; recognition of the common male responsibility is relatively rare.

On the other hand the few specialised clinics which at present give advice on sterility are sought out by increasing numbers of women. Of the present generation of potential mothers one Glasgow hospital which maintains a sterility clinic (for women only) admitted 303 cases in 1938; and 505 cases in 1942. A similar increase of attendances has also been seen in others of the few clinics in this country which supply adequate facilities for the diagnosis and treatment of sterility. The interest shown by childless men is of a less active kind, but refusal to undergo examination is rare in childless or child-poor men (under 5% in hospital practice). A consideration of all available data strongly suggests that the barren and the very small family reflect lower fecundity rather than excessive unwillingness to reproduce. This being so, no effort to solve the problem of the decline in the population can be considered satisfactory unless it recognises the necessity for providing facilities for the skilled diagnosis and treatment of all grades of infecundity.

CURRENT EXPERIENCE

Mr. R. CHRISTIE-BROWN said at the conference:

> Of 400 patients who have consulted me with reference to some gynæcological or obstetric condition, 100 of these were complaining of sterility. . . . In only 32 of these 100 cases did the husband submit his semen to test, and of these 12 were considered to be sterile.

Dr. MARGARET HADLEY JACKSON had found that the number of patients coming for advice on sterility to the Exeter Family Planning Association Clinic had increased rapidly over the past few years. She gave the following figures of cases treated:

1930	*'31*	*'32*	*'33*	*'34*	*'35*	*'36*	*'37*	*'38*	*'39*	*'40*	*'41*	*'42*	*'43**
0	0	1	0	1	1	6	10	11	12	15	23	30	51

* To July.

In the early years, she said, patients had come on their own account but for the last two or three years most of them had been sent by their own doctors. Of the 51 cases seen so far this year, 20 had used no form of birth control. Before attending the clinic patients had been married for an average of 5 yr. 2 mo. Less than 2% of husbands had refused to supply seminal specimens for examination: and rather more than 50% of these specimens had shown evidence of reduced fertility.

Miss M. MOORE-WHITE, FRCS, had obtained the following figures from a series of 100 consecutive cases
c it had been possible to analyse the husband's
She noted that out of 162 new attendances in less than a month, 17% were seeking advice for sterility: only 1·8% had been married for less than 2 years.

		%
Nothing abnormal in either couple (no tubal obstruction, serious seminal changes or gross endocrine defects)		20
Women:	Fallopian tubes	
	Blocked	17
	Patent	52
	Rigid (no peristalsis)	24
	Obvious endocrine defects	7
Men:	Normal	43
	Impaired fertility	43
	Azoospermia	11

Dr. ALBERT SHARMAN reported that the total number of new patients complaining of primary sterility at the Royal Samaritan Hospital for Women, Glasgow, had risen from 392 in 1938, and 387 in 1939, to 505 in 1942 and 318 for the first six months of 1943.

In England Now

A Running Commentary by Peripatetic Correspondents

I AM working in a large municipal hospital. After more than thirty years service in a voluntary hospital with a medical school I find constant interest in noticing the differences between the two. They are not always easy to discern or to define, and yet all the time I am conscious of some subtle but definite difference in the atmosphere in which I work from that to which I have been so long accustomed. Some at least of the reasons for this are plain enough. First there is the physical environment. This straggling yellow brick building and its long stone-floored corridors are without charm, as they are without tradition. How much these two qualities affect us in our student days, as we pass through some great London or provincial medical school, it is hard to say. At the time we do not realise much the effect of these influences, but later in life we know that the influence was there and that it is still active. Does the Guy's man ever quite forget that his was the hospital of Astley Cooper and of Gull, or the Bart's man that Abernethy and Paget worked there, or the doctor from St. George's that he shared those precincts with Hunter and Jenner and Brodie? The municipal hospital has no such background. It is not the fault of the system on which it is run: it is merely the defect of youth, and youth is a fault which time cures. Doubtless, too, age will improve even the appearance of these institutions. Years will mellow the yellow brick. Flower beds and flower boxes may appear, grass plots be laid in the grounds. Another potent cause of the different feeling that one gets here from that engendered in the voluntary hospital is the absence of students. There is a lack of cheerfulness, let alone of gaiety—two emotions as precious to doctors as to their patients. There is, too, absence of that healthy rivalry set up by competing companies of dressers and clerks each jealous for the renown and performance of its own chief. This is replaced by an overwhelming obligation to conform to the many rules and regulations of the institution and a haunting fear lest one tread on the toes of a superior officer, or (more dreadful still) fail to comply with some rule, regulation or desire of the lay persons who are lords and masters of the hospital. One feels a lack of freedom. Worse still there is the impression that the primary object of the place is to put forth records that will satisfy the council. Records become more important than recoveries. Treatment may fail: that will not be observed by the ladies and gentlemen of the governing body. But what is written down is open to their inspection and the year's figures must not fall below those of former years.

Some of the sisters here are so hard put writing statements in triplicate that they barely find time to supervise their nurses and wards. At a time of paper shortage this hospital could still rival most government departments in the production of script that will be rarely if ever read. The fanatical inelastic devotion to routine rule and regulation has sometimes an unexpected and curious result. There is said to be a man here who drifted into an observation ward, having somehow avoided the proper mode of entry to the place. He was accredited to no medical officer. He made himself useful in the ward and the Sister liked him. It was nobody's duty to displace him; he had not been officially admitted so he could not be officially discharged. So far he has been an inmate for a mere fifteen years

* * *

Dr Gray's proposal which its representatives adopted recently, that the BMA should seek to establish itself as a corporate body, reminds one naturally of the BBC where the parallel of the doctor patient relationship persists unimpaired Each licenced listener, paying his less than a shilling a month towards the maintenance of the national radio service still retains unchallenged the ancient Englishman s right to choose his own set—

but at this point in the parallel

Choose your own doctor?

dammit, Madam, you *cannot* choose your own bottle of medicine, no matter how pretty it looks!" However

* * *

The little lane leading to the great hospital where I go to work has on one side a high old brick wall and on the other a row of six tiny cottages joined together A slanting tiled roof covers them, and each has white shutters to its little square paned window, and an architrave of wood over its green door The door itself is made in two parts, divided horizontally Thus the little inmate can at will peer out of the upper part without opening the lower to an intruder These six little houses are three hundred years old They are a charity and are occupied by six little old women The occupants must be old, to satisfy the terms of the bequest, and they must be little to meet the restriction of the houses No large woman could exist happily in one of these dolls houses There is a front room which is parlour, dining and bedroom, and beyond a tiny kitchen leads on to a diminutive garden Here the little old women grow a few vegetables and a few simple cottage flowers Beyond the garden flows a small stream With this behind and an unfrequented lane in front, the cottages provide as quiet a haven as could be wished Yet my only conversation with any of the inhabitants was to take part in a quarrel Human passions defy environment as well as old age As I passed up the lane number Six was in difficulty with her doorkey She was locked out of her little house and could not open the door She appealed to me for help Three doors down number Three could be seen peering over her half door "She can do it," cried number Six, "she can let me in, but she is a wicked woman Oh, she is a wicked woman and I got her here She is at that cottage through me and she is such a wicked woman" I walked along to wicked number Three who seemed an amiable old lady, she denied all knowledge of number Six's assertions and especially that she could be of any help about the door So I went back to

she walk with me to wh

the cottages She fell in

we started, the old lady

on the iniquities of number Three Poor number Six A few days later when I passed her door no half pint of milk stood in its usual place outside, shutters were closed and door shut Number Six now is a newcomer just as old and small but without apparent antipathy to number Three What strange mental disturbance heralded the rapid decline and death of that old woman I am not enough of a neurologist to explain

* * *

For years I had admired Kingsley Wood's devotion to running a legal aid bureau for poor persons in Shoreditch before I first came into personal contact with him over the National Health Insurance Bill, when he was indefatigable in helping Mr Lloyd George to bring in the industrial insurance companies, for which Sir William Beveridge now has so little use As chairman of the London Insurance Committee he was always friendly and always helpful when his interests did not differ from medical interests and whenever we met he had a cheery word to say about the old fighting days I never regarded him as a heavy weight but I am bound to say that his subsequent career modified that opinion He was of course handicapped by his cherubic appearance and by his voice, but he triumphed over these difficulties It has been said that he was a friend of the little man and rather inclined to distrust experts, particularly medical experts, that is a pretty sound opinion and I would add for myself that he was actuated not only by ambition but by a genuine desire to do good public work At one thing he was transcendently good he introduced orderliness into every department he entered And that I expect explains why our lift attendant was enthusiastic about the way everyone, including himself, had been fairly taxed

* * *

For some time past I have been carrying out a miniature Gallup poll on my own by putting to my friends the question, which of the national services apart from the fighting services will have the strongest claim on the Treasury after the war? No one has yet categorically

hink housing,

of transport

ome when we

ing that the

allocation from the Treasury will be strictly limited (not to mention that from local rates), in what order should we *start our reforms? It is very important we should* have clear ideas about this

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MEDICAL DEFENCE UNION

Dr JAMES FENTON, addressing the annual meeting on Sept 21, said that the abbreviated report was not an indication that the work of defence had grown smaller or that members of the council had given less service Notwithstanding difficulties of travel and pressure of professional work the meetings of the council and its committees had never been better attended Omission from the report of the useful comment on medico legal problems was simply a measure of the council's desire to assist the Government s war effort in saving paper The war had not indeed reduced the number of allegations made against members of our profession, litigation continued on an increasing scale and the public were increasingly insistent on their rights Hundreds of members had been interviewed during the year, and thousands of letters of advice written Dr Fenton referred to "the Spackman case" in which the union had challenged the procedure followed by the General Medical Council, which took the case to the House of Lords where it was settled in favour of Dr Spackman who had now been reinstated on the Medical Register The decision of the House of Lords would, he felt sure be quoted through the years to come as a benefit not merely to Dr Spackman, but to the profession as a whole and he paid tribute to Mr Hempson (solicitor) and Mr Dickens (counsel) who remained steadfast in their opinion from beginning to end "I wish" he went on, "to add the opinion of myself and others of our council that the General Medical Council is anxious to be fair to all who appear before it on any charge whatever We are closely acquainted with the work of the GMC, and we hold the view that it is well

MDU did not in any way object to the GMC going to the House of Lords We appreciated entirely their point of view, there was merely a difference of opinion by the legal experts who advised the two bodies, and it was felt on all hands that it should be solved once and for all We have always been happy to work in close harmony with the GMC, and nothing has arisen between us in this case to interfere with our relationship

Dr Fenton concluded with two warnings The doctors who are coming back to practise, taking the place of colleagues who have been called up may have terminated their membership of the union on retirement and may not now be in full benefit Their first duty to themselves and their families is to satisfy themselves that they are once more registered as members Better still if doctors hesitated before resigning membership on joining the Army or retiring for legal questions arise and charges are made months or even years after the alleged negligence occurred And secondly doctors must not assume that membership of the union will be unnecessary if the state takes control of the profession The state will certainly not accept liability for their errors or omissions

Following the meeting the elected members of council reappointed Dr Fenton president for the session 1943–44 Mr L D D Davis treasurer and Dr Rock Lynch chairman of committee Mr Ivor Back s name was added to the list of vice presidents

Letters to the Editor

SCIENTIFIC FREEDOM IN GOVERNMENT SERVICE

SIR,—In your issue of Oct. 2 a correspondent, signing himself or herself Argus, states that "a doctor working in the Civil Service is, in fact, effectively gagged; he can say or write only what has official approval." Speaking for the Post Office, which is numerically the largest department of the Civil Service and, in ordinary times, as large as, or larger than, all other departments of the Civil Service combined, I should like to say that this gives a wholly misleading impression. The Post Office, as the largest and oldest industrial medical service in the country and probably the world, has kept accurate working life-time sick records of all its employees of all ranks for nearly a hundred years. These have made possible long-distance large-scale observations, many of which have been published. To mention only two, it was largely upon published Post Office medical experience that the non-pathological nature of adolescent albuminuria was established and accepted. More recently, it was largely upon published Post Office medical experience that the futility of quarantine in the case of healthy contacts with the ordinary zymotic diseases was demonstrated. Further, the researches and medical experience of the Post Office have been freely open to—and largely made use of by—welfare and medical officers in outside industry; and everybody in the Post Office has been only too glad that this should be the case.

There has certainly been no gagging of its medical staff, either in the way of research or publication. I cannot speak with equal knowledge of other departments of the Civil Service. I can imagine it possible, for instance, that a medical research into the toxicology of some substance used in industry or munition-making might be temporarily withheld from general publication for quite valid reasons of state, especially in war-time. This is not to comment upon any possible future development of hospital or general medical practice. But I should be surprised to learn from your correspondent that, apart from such possible instances as I have suggested, any valuable piece of medical research work had been deliberately suppressed by the head—permanent or ministerial—of any Civil Service Department.

London, E.C.1. H. H. Bashford.

GOING UNDERGROUND

SIR,—Sufficient coal is not being got to maintain the war effort and keep us warm. Men are being returned to the mines from other industries, and miners prosecuted for absenteeism. Recently the best part of a coal-field has been on strike in Nottinghamshire because a surface worker was sent to prison for refusing to go down the pit. Dr. Culpin has drawn attention to the psychological aspects, but there is ever a more important point of view.

While all this is going on, complicated discussions are proceeding about the establishment of a State Medical Service (to which I am, incidentally, whole-heartedly opposed), and it is said that it should be the function of the medical profession to lead the way in the improvement of social conditions, housing, food, and work. Is it not strange that the medical profession has remained so silent on the present mining troubles? If it ever is to fulfil the function of leading the way to a New World, then doctors should speak now.

Apart from your excellent leader (*Lancet*, 1942, i, 417), I can remember no pronouncement on the miner's burden, but there must be doctors far better acquainted with the mining industry than I, who could quickly point out the root of the present troubles. If this letter succeeds in stimulating them to speech or to writing, its object will be attained.

It seems almost pathetic that the two basic industries of this country, the Merchant Navy and coal, should have been, and are, so neglected. Today the average miner says, and means, "My child shall not go down the pit." Because he knows the appalling working conditions, to life and limb, and the hopelessness of an injured man obtaining work elsewhere. Any improvement in miners' working conditions, or any advance in wages, have only been obtained after a bitter struggle between employees and employer. Surely, before miners are prosecuted for absenteeism, attempts should be made to improve the working conditions of the miner and the conditions under which he lives in the mining villages, and to restore trust between the two sides of the industry.

Perhaps this is being done. If it is, let us hear about it, and let us hear the views of those doctors who are in close contact with mines and miners.

Southwell, Notts. T. A. Lloyd Davies.

INTRAPERITONEAL SULPHONAMIDES

SIR,—Your leading article of Sept. 25 will, I hope, stimulate British surgeons to greater interest in a valuable adjunct to the treatment of the infected peritoneum. Little has been published in this country on the use of sulphonamides in the peritoneal cavity and more experimental work is necessary to establish such treatment. I have employed sulphapyridine in most of my cases; sulphanilamide and sulphathiazole have not given me nearly such good results in cases of intraperitoneal infection. The inevitably contaminated abdominal wound has nearly always healed by first intention in my experience which now extends over two and a half years. The risk of jaundice or other intoxication appears to be negligible, provided enough fluid is taken, and the peritoneal dose need not be supplemented by oral or other routes. Doses up to 25 g. are safe and the presence of the drug in the blood-stream seven days after administration testifies to its slow absorption. But, as you rightly emphasise, this new chemotherapy is not a panacea for all ills and must not replace scrupulous surgical technique.

Aylesbury. R. H. Gardiner.

MITES IN TABLE SALT

SIR,—A woman in this district purchased a packet o table salt which she took home and from it filled the salt-cellar. She thought that somehow she had inadvertently mixed pepper with the salt, until to her horror she saw the pepper heaving and drifting along the surface. There were thousands upon thousands of mites, tyroglyphidæ of some sort, but how or why they invaded the salt is a mystery. Various species, all much alike, do at times infest cheese, flour, sugar, dried fruits and so on, but I can find no record of them being found in salt. They are pale, soft-bodied and eyeless with prominent cheliceræ and a few long bristles, the larger ones with faint magenta staining of the head and feet. No other package of salt had been invaded and each had apparently been packed ready for sale by the manufacturer or wholesaler in grease-proof paper bags enclosed in cardboard containers. This season has been beneficent to all pests and it may have encouraged an adventurous order of the arachnida to a too dangerous exploration as the mites all died in the salt two days afterwards.

A. G. G. Thompson,
Lambeth, S.W.2. Medical Officer of Health.

DR. WILLIAM PASTEUR

SIR,—In the obituary tributes to the late Dr. William Pasteur in your issue of Sept. 18, his chief claim o posterity—namely, that he discovered, described an put on the map of medicine for all time the conditio known as massive collapse of the lung—is not mad clear. I am sure that all those who served with or unde him would wish that this, his outstanding achievement should be permanently associated with his name.

Harley Street, W 1. Victor Bonney.

FIRST AID FOR FRACTURE OF LOWER JAW

SIR,—Lieut.-Colonel Moir calls attention to the need o knowledge on first aid for fracture of the lower jaw, an the points he makes will be agreed to by maxillo-facia surgeons. I would suggest two brief modifications.

1. To the words "Irregularity in the line of th teeth" I would like to add "possibly only detectabl when the jaws are approximated."

2. I would like it made clear that when a casualty i

carried by stretcher he *must* be carried feet first in order that the rear stretcher-bearer may constantly observe his condition

Oxford D S HAYTON WILLIAMS

INFLAMMABILITY OF TRICHLORETHYLENE

MR C LANGTON HEWER writes —In a paper read last May before the section of anæsthetics, RSM I stated that "trichlorethylene vapour will not burn or explode if mixed in any proportion with air, oxygen or nitrous oxide" It appears, from research recently carried out by the Bureau of Mines Pittsburg, USA, that this statement is true only if the temperature does not exceed

flammable So far as I know, there are no data relative to the inflammability of nitrous oxide, oxygen, trichlorethylene mixtures at high temperatures, but the matter is being thoroughly investigated by I C I Ltd Pending the publication of their report it would seem wise to use 'Trilene' mixed with air only, if there is any risk of a source of ignition coming into contact with the anæsthetic gases

Corrigendum —In our issue of July 10, p 58, the letter signed Thomas James was in fact sent by Squadron Leader Theodore A James, MB

Obituary

RICHARD AUSTIN FREEMAN

M R C S, L S A

DR Austin Freeman who died at Gravesend in his 82nd year, qualified in 1886 from the Middlesex Hospital, where he was house-physician For twenty years, on and off, he worked in Africa on the Gold Coast, accompanying a mission to Ashanti and Bontuku as medical officer, naturalist and surveyor, and later being appointed a member of the Anglo German Boundary Commission for Togoland In 1892, after being invalided home with blackwater fever, he entered general practice and later became medical officer to Holloway Prison and acting assistant MO to the Port of London Authority In 1901 his health forced him to give up medicine for authorship and some of "Dr Thorndyke s" best years followed He served in command of a field ambulance in the RAMC (T) during the last war, remaining on the active list till 1922 His works included a book on Ashanti and Jarman, and *Social Decay and Regeneration* published in 1921; but it is in Dr Thorndyke's laboratory that his colleagues will miss him He was a freeman of the Society of Apothecaries and was elected to the livery in 1929 He married in 1887 Annie Elizabeth Edwards, they had two sons

ALAN FORD SMITH

B M OXFD, M R C P, CAPTAIN RAMC

THE death of Dr A Ford Smith while serving in the Middle East is announced He entered the London Hospital with an open scholarship in 1934 from Lincoln College, Oxford, after gaining a first in the honours school of physiology, and as a student gained many hospital prizes He was a student demonstrator of anatomy in the medical college, and after qualifying in 1937 he became house physician to the medical unit and to the department of physical medicine, and assistant in the pathology department Later with a Nuffield research scholarship he returned to Oxford to work under Professor Witts until on the outbreak of war he joined the RAMC. J B. writes · "Human beings were Tommy Ford Smith's chief interest and being so human himself he made friends in all walks of life He looked only for simplicity of heart in his fellows and had no use for pretentiousness He could master in an hour a subject with which his friends might wrestle for days, but he never minded when like vultures we used to pick his brains He seemed to have read everything, but he carried his knowledge of literature and art with easy grace and no trace of pomposity The intelligence, gaiety and charm that were housed in Fordie's lanky and picturesque form will be remembered by all who knew him"

MEDICAL RELIEF IN FREED EUROPE

THE "challenge to medical sciences' which occupied countries will offer when they are freed was discussed in London last Saturday at a conference convened by the Association of Scientific Workers, with Dr DOUGLAS McCLEAN in the chair

DR A MARTEAU, who lately left Belgium, said that within three months of the Nazi occupation the situation in that country was worse than at the end of 1917 Today people who are not wealthy—i e, the large majority—subsisted on a daily ration of ½ lb bread, a few potatoes, very little in the way of vegetables, and exceptionally a tiny piece of meat The result was a general loss of weight, lower resistance to physical and mental strain and to infection and a reduction in the birth rate Reassuring statistics published under the authority of the Germans or of quislings were valueless The only means of true relief was victory to send food to Belgium now would ultimately be to help Germany, though an exception might possibly be considered for the children To bring relief after the war a few units from the USA and Britain would not suffice Help must be found in the country itself, and distribution should be entrusted to the local authorities once these have been purged The political aspect of this major problem must not be allowed to paralyse all action In certain quarters political considerations and social prejudice predominated Belgian resistance, however, had not given way to threats or oppression, nor would it be disposed to accept in any form, a dictatorship of corned beef and condensed milk Much had been said of *unconditional surrender* The *peoples starved by Hitler* would accept only one kind of relief—unconditional relief

Dr V KRUTA, of Czechoslovakia, spoke of the urgent need to provide food for people in concentration and other camps and ghettos who would be faced with starvation on the collapse of the Nazi administration The enormous movements of population would create many problems

Dr A P CAWADIAS explained how the worst of the famine in Greece was relieved by supplies of British and American food after April 1942 But the effects of famine, he said, do not cease with the arrival of food An epidemic of typhus in Athens gave warning of what was to come, and continued malnutrition had brought a terrible increase in disease, including malaria, tuberculosis and hunger œdema Against the consequences of malnutrition "we shall have to fight for a whole generation"

Prof A SARKISOV described the devastation wrought in the USSR by the invaders and the measures taken to meet the immense need arising from it

Prof J R MARRACK, speaking on present plans, said that relief was not confined to food, its object should be to set peoples on their feet again, and this meant that railways and factories must be set working and that livestock, seeds and raw materials must be supplied—on a basis of lend lease rather than charity After the last war surplus stocks of food were sent to Europe, and this benefited American farmers But these supplies of foods that happened to be surplus were inadequate, and physiological needs were now better understood The actual amounts that would be required were small in comparison with total consumption in, for example, the USA Rationing could provide enough of certain foods that otherwise would be short Relief might prove to be the beginning of an internationally controlled consumers' economy

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OPHTHALMOLOGICAL SOCIETY OF EGYPT —To encourage scientific ophthalmic work this society has instituted a prize which will be awarded each year for the best essay submitted at its congress The competition is open to all members of the society who have been in practice for less than 20 years Further particulars may be had from the secretary, 42, Kasr El Ainy Street, Cairo

ROYAL SANITARY INSTITUTE —A meeting will be held at the
Saturday, Oct 16, at 10 30 AM
egional officer for the Ministry of
will read a paper on town and

"RELIGIO MEDICI"

A TERCENTENARY TRIBUTE

DOUGLAS GUTHRIE, M D EDIN, F R C S E

Sir Thomas Browne's *Religio Medici* (The Religion of a Physician) can be classed neither as a medical nor as a scientific work, yet it occupies a unique place in literature because of the perennial freshness of its message and the delightful manner and style in which that message is presented. It has had many imitators. All manner of "religios" have appeared, pertaining to numerous callings. Thus we have *Religio Clerici*, *Religio Jurisprudentis* and such-like publications; but none of them can match the original model.

Many men of letters have paid homage to Sir Thomas Browne. Coleridge, Lamb, Lowell, Johnson and many another has acknowledged his influence, and in our own day Sir William Osler has done much to revive the peculiar attraction which the *Religio* must ever hold for the medical man. Needless to say, Browne has also had his critics since the fashion was set by the dreary Aberdonian philosopher, Alexander Ross, whose *Medicus Medicatus or the Physician's Religion cured by a lenitive or gentle Potion* only added to Browne's popularity. Sir Kenelm Digby's *Observations upon Religio Medici* did still more, and thereby hangs the tale of the publication which may be here retold.

THE STORY OF THE FIRST EDITION

Dr. Thomas Browne, the son of a mercer of Cheapside, London, had studied in Oxford, spent three years in the medical schools of Padua, Montpellier and Leyden, had commenced practice in Norwich, and had married Dorothy Mileham, before the authentic edition of *Religio Medici* appeared in 1643. Originally written at Shipden Hall, Halifax, just after the author's return from the Continent, it was not intended for the press but was composed as "a sort of private diary of the soul." The writer was still young. "My life, it is a miracle of thirty years," he observes in one place, and in another, "nor hath my pulse beat thirty years." The manuscript was circulated among friends, and frequently copied, as a number of manuscripts still exist although none in Browne's handwriting. The publication of such a document was a temptation too great to be resisted; one of the manuscripts reached a printer in 1642 and was "most imperfectly and surreptitiously published." Worse was to follow, when a copy of the pirated edition was bought by the forceful and versatile Sir Kenelm Digby, then in prison for a political offence. Within 24 hours, if we are to believe him, the prisoner had written and published a review and criticism which caught the public imagination. Browne was now obliged to take action. With characteristic liberality he supplied to the same publisher the corrected edition and thus, early in 1643, *Religio Medici* became available for all readers. The alterations do not appear to have been very extensive. Even the frontispiece of the "surreptitious" edition was used, and has been reproduced many times. It represented a man, falling from a high cliff, caught and rescued in mid-air by a hand emerging from a cloud in the heavens, and it bears the legend "*a cœlo salus.*"

THE "RELIGIO" AND ITS MESSAGE

It is not easy to explain in a few sentences the nature of *Religio Medici*; indeed it is by no means easy to read, for it is a work which must be studied and pondered for many a day before its magic and fascination captures the average reader.

The very title of the book was a paradox when it appeared; the medicus of that day was held to be a sceptic in matters of religion, and the new learning, already in full flood on the Continent and gradually extending to Britain, tended to widen the gulf between religion and science. Yet Browne sets out to state his argument in favour of a wide and liberal interpretation of Christianity, for "those who do confine the Church of God either to particular Nations, Churches or Families, have made it far narrower than our Saviour ever meant it." At the outset the work claims that he "dare without usurpation assume the honourable title of Christian"; but, he continues, "I borrow not the rules of my Religion from Rome or Geneva, but the dictates of my own reason." His views are "not wrung from speculations and subtilties, but from common sense and observation; not pickt from the leaves of any Author, but bred amongst the weeds and tares of mine own brain." He has no antipathy to "Turks, Infidels and Jews," but, for himself, he finds that "there is no Church whose every part so squares unto my Conscience," so "consonant unto reason" and so "framed to my particular Devotion, as the Church of England."

Having said this, he is not prepared to argue further, for he has "no Genius to disputes in Religion," however argumentative he may be in other matters. "In Philosophy, where Truth seems double-fac'd, there is no man more Paradoxical than my self; but in Divinity I love to keep the Road; and, though not in an implicite yet an humble faith, follow the great wheel of the Church." "As for those wingy Mysteries in Divinity and airy subtleties in Religion, which have unhinged the brains of better heads, they never stretched the Pia Mater of mine." Like many another man of Science he keeps his Religion in a separate compartment, for "many things are true in Divinity which are neither inducible by reason nor confirmable by sense." Of course he was faced by problems, but he was content merely to state them and to believe that "there is some other hand that twines the thread of life other than that of Nature. I am sure we do not err if we say it is the hand of God." For instance: "For the first chapters of Genesis, I must confess a great deal of obscurity," and "I would gladly know how Moses with an actual fire calcined or burnt the Golden Calf unto powder, for that mystical metal of Gold, exposed to the violence of fire, grows onely hot, and liquefies, but consumeth not."

We are not surprised to find Browne sceptical of Hell a grim reality in his time. "I thank God," he writes "that I was never afraid of Hell, nor ever grew pale at the description of that place." "I can hardly think there was ever any scared into Heaven; they go the fairest way to Heaven that would serve God without a Hell," Nor can he "dream that there should be at the last day any Judicial proceeding or calling to the bar as indeed the Scripture seems to imply, and litera Commentators do conceive."

So futile is religious argument, that he considers it would be for the benefit of learning, were it possible to limit the literature of religion to "a few and solid Authors; and to condemn to the fire those swarms and millions of Rhapsodies, begotten only to distract and abuse the weaker judgments of Scholars, and to maintain the trade and mystery of Typographers." One shudders to think how Browne would have regarded the books of today.

As a medical man he must needs refer to the mystery of the soul, stating that "amongst all those rare discoveries and curious pieces I find in the Fabrick of Man, there is no Organ or Instrument for the rational Soul; for in the brain there is not anything of moment more than I can discover in the crany of a beast, and this is an argument of the inorganity of the Soul. Thus we are men, and we know not how; there is something in us that can be without us, and will be after us; though it is strange that it hath no history what it was before us, nor cannot tell how it entered in us."

The Medicus makes further reference to his anatomica studies when he refers to those patients, so well known to every medical practitioner, who "think health an appurtenance unto life, and quarrel with their constitutions for being sick?"; "but I," writes Dr. Browne "that have examined the parts of man, and know upon what tender filaments that Fabrick hangs, do wonder that we are not always so; and do thank my God that we can die but once." Not content to contemplate such mysteries of Nature as the Tides the Nile floods, and the Magnetic Ode. he "studied to match and parallel those in the more obvious pieces of Nature, which without further travel I can do in th Cosmography of myself." "We carry with us th wonders we seek without us: there is all Africa and he prodigies in us. . . ." Extending his observations t the animal world, he remarks that "there are no Grotesques in Nature," and "no deformity in any kind o species of creature whatsoever." It is not surprisin that he was more intrigued by the habits of insects tha by such "prodigious pieces of Nature, Whales, Elephants and Dromidaries." There was "more curious Mathematicks" in bees, ants, and spiders, and "the civility of these little Citizens more neatly sets forth the Wisdom of their Maker."

In the second part of *Religio Medici* the author turns from the theme of Faith to that of Charity.

Browne had a truly international outlook which must have been as rare in the 17th century as it is today. His was "a constitution so general, that it consorts and [illegible] antipathy, or [illegible] r, any thing. [illegible] Frogs, Snails and Toadstools, . . . but being amongst them, make them my common Viands." "At the sight of a Toad or Viper, I find in me no desire to take up a stone and destroy them." "National repugnances do not touch me, nor do I behold with prejudice the French, Italian, Spanish or Dutch." This he writes at a time when "whole Nations miscall each other by opprobious Epithets" and when scholars wielded pens which [illegible]

How could men judge aright, with such imperfect knowledge? "No man," answers Browne, "can justly censure or condemn another, because indeed no man truly knows another." How many of us could echo such noble sentiments? Thus he continues, condemning [illegible] sleep and [illegible] "another [illegible] commands [illegible] and bastards me.

Browne's experience as a physician leads him to pray, "Let me b [illegible] the malady of my patient be [illegible] l to feel "not only ashamed l [illegible] here are diseases incurable; yet not for my own sake, or that they are beyond my Art, but for the general cause and sake of humanity."

LATER LIFE IN NORWICH

No series of extracts from *Religio Medici* can convey the charm and interest of the complete work. It is like a piece of music, which must be played in its entirety to be fully appreciated. Of course Browne had his faults. We find it hard to understand how so saintly a man could write "I have ever believed, and do now know, that there are witches," and could even supply the evidence upon which two unfortunate women accused of witchcraft were condemned to death at Lancashire Assizes in 1635. Perhaps one should rather marvel that in other respects the author of *Religio Medici* held views far ahead of his time. As so often happens, the *Religio*, his first work, was also his greatest. His second, *Pseudodoxia Epidemica* was published in 1646. It was an inquiry into certain "vulgar errors" and is full of quaint and picturesque argument. Did moles possess eyes? Did swans sing whilst dying? Were the legs of the badger shorter on one side so that it could run on the side of a hill? Could the ostrich digest iron? Such are a few of the "errors" discussed in this curious book.

Two other books followed in 1658, *Urn-burial* and *The Garden of Cyrus*. Dr. Browne was a physician of high repute, his large medical practice including such well-known families as the L'Estranges and the Pastons and extending far beyond the city of Norwich. He was also a keen naturalist and archæologist and it was natural that he should be informed of a number of cinerary urns near Walsingham. Yet no-one can regard his book, *Hydriotaphia, Urn-Burial* as a contribution to archæology. The urns are simply the text of a magnificent discourse upon man's mortality. It is strangely ironical that the skull of Sir Thomas Browne, he who had that horror of being "k [illegible] museum of [illegible] until 1922, [illegible] of St. Pete [illegible] "Who knows the fate of his bones, or how often he is to be buried?" Today he would have been a strong supporter of cremation.

The Garden of Cyrus contains as little of horticulture as *Urn-Burial* does of archæology. Obsessed by the geometrical form known as the "quincunx," the writer wanders on in tantalising fashion, often becoming almost unintelligible, until at the end he rises to the very summit of English prose in a grand peroration.

Of the closing years of Browne's life we have little information. For 46 years he practised in Norwich, but his fame extended throughout the world of letters. He lived in troublous times and was a good Royalist, but he was too wise to dabble in politics. Throughout all the current turmoil, he and his wife Dorothy enjoyed long and happy lives. Edward, the eldest of their ten children, attained a distinction almost equal to that of his father. He travelled far and widely in Europe, and wrote an account of his journeyings, then became a leading physician in London, a fellow of the Royal Society and physician to the king. It was that king who knighted the father during a visit to Norwich in 1671. Charles II was about to confer this honour upon the Mayor, but that honest man informed the king that a more worthy recipient of the royal favour was present in the person of the famous doctor, who thereupon became Sir Thomas Browne.

He died 14 years later, on his 77th birthday. Some twenty editions of the *Religio* had appeared during his lifetime and the book had been translated into Latin, Dutch, German, French and Italian. It has been reprinted many times since then. Although it proclaimed no new discovery, nor even any new idea or method, the influence which it exercised in its day has steadily grown and it continues to attract an ever-increasing circle of devoted readers.

Appointments

COWAN, W. J., MB EDIN.: RSO at Preston Royal Infirmary.

DUNLOP, E. M. N., LRCPE: orthopædic registrar at Warwick Hospital.

GOOD, W. C., FRCSI: RSO at St. Mark's Hospital, London.

HALBERSTAEDTER, MAX, MB LOND., DMR: chief asst. to the radiotherapeutic research dept. at St. Bartholomew's Hospital, London.

HARRIS, E. D., MB LOND., FRCS: temp. surgeon to the ear, nose and throat dept. of the Hampstead General and North-West London Hospital.

[illegible] istrar at the

[illegible] tory surgeon

[illegible] and fracture

[illegible] gist at the

[illegible] ical superin-

[illegible]).

[illegible] St. James's

[illegible] PH: divisional medical officer,

[illegible] RSO at the Prince of Wales's

Births, Marriages and Deaths

BIRTHS

BARBER.—On Sept. 27, at Great Dunmow, Essex, the wife of Dr. Geoffrey Barber—a son.

[illegible] r. H. F.

[illegible] quadron-

[illegible] -Colonel

[illegible] f Major

[illegible] Oxford

—a son.

MARRIAGES

[illegible] Campbell,

[illegible] leld, FRCS,

[illegible] to Nancy

DEATHS

ALLEN.—On Sept. 26, in Liverpool, James Davison Colquhoun Allen, MB EDIN., of Hoylake and formerly of Bath, aged 76.

COWEN.—On Sept 25, George Hebb Cowen, MS LOND., FRCS, of [illegible]

FRY. [illegible] A CAMB.,

FUL [illegible] arrogate,

HEY [illegible]

PASE [illegible] al, near

PRIE [illegible]

Notes and News

THE FAMILY DOCTOR AND PREVENTIVE MEDICINE

SPEAKING at Westminster Hospital medical school on Oct. 4 Mr. ERNEST BROWN, Minister of Health, spoke on the relation of the individual doctor to the organisation of preventive medicine. "Some of the problems involved," he said, "raise broad questions of social policy—housing, agriculture, foreign trade, taxation. On these the individual doctor as citizen has his part to play, a part which in his case cannot fail to be important owing to the professional weight attaching to his views. (And I would put in a plea that the doctor should not ignore or contemn his duties as a citizen in this context. Doctors like other men are, or ought to be, political animals). But as a doctor even more than as a citizen he must be closely concerned with the promotion of health. Some of the profession will, of course, be in contact as experts with environmental problems—the medical officer of health, the bacteriologist. What I have in mind, however, is rather the general practitioner, the family doctor, and his relationship to prevention. Here I am sure there is one reform we must work for, and that is to bring together again the family doctor and those personal preventive services like child welfare and the care of pregnancy, which have tended to develop along increasingly divergent courses. That is one reason why it is so essential to plan for a comprehensive service which provides a family doctor for those many families that have hitherto been without one. Another reason in my view is that the general practitioner can and will have a most important rôle in putting across to the individual citizen the principles of positive health. We are gradually realising in this country the importance of health education, and we are gradually learning more effective ways of catching the ear and the eye of the public at large. But in bringing home to the individual parent or adolescent or child the principles of healthy living there is no method so effective as that of personal contact and individual advice, and no adviser so effective as the family doctor. My hope for the nation's health in the future is therefore that, on the firm foundation of comprehensive curative medical facilities available to every citizen, we shall be able to build a health service with the positive promotion of health as its foremost object; and that the medical profession, no longer engaged almost wholly in a ceaseless struggle to check the ravages of disease, will be free for the first time to occupy its rightful place as the guide of the community in the paths of the truly healthy life."

Royal College of Surgeons of England

Arnott and Erasmus Wilson demonstrations and museum lecture demonstrations are to be held at the college, Lincoln's Inn Fields, London, W.C.2, on weekdays at 4 PM from Oct. 18 to Nov. 5. Prof. A. J. E. Cave is to speak on cerebral and cranial veins, the portal vein and the portal-systemic anastomoses, the major lymphatic trunks, the development and anatomy of the palate, the naso-pharynx and eustachian tube, anatomy of the axilla, the carotid sheath and other fascial structures, tendons and tendon sheaths, and the anatomy of intra-articular structures. Mr. L. E. C. Norbury will also speak on multiple primary malignant growths with special reference to the colon and rectum, Mr. R. Davies-Colley on certain states of bone absorption, Mr. C. E. Shattock on tumours of the kidney, and Surgeon Rear-Admiral Wakeley on tumours of the alimentary tract.

University of Aberdeen

At a graduation on Sept. 29 the following degrees were conferred:

MB, ChB.—William B. Burnett (with first-class honours); R. N. Johnston and M. R. Milne (with second-class honours); J. R. Anderson, R. J. Anderson, Eba C. Baird, Sheila M. Baker, J. B. Bittiner, Hugh Brebner, G. W. D. Campbell, Mary E. Chalmers, G. C. Chessor, Charles K. Clark, Catherine M. Coull, I. C. Cowan, M. M. Craig, Thelma C. Cruickshank, Sheila R. Dalgliesh, W. J. Dawson, R. C. M. Dingwall, G. A. Findlay, D. A. Forbes, A. G. Fraser, I. A. Fraser, Joseph C. Gardiner, Helen E. Gordon, J. B. Gordon-Russell, Charles Grant, Mona Griffin, F. W. Henderson, Valentine M. Husband, I. D. Innes, Kathleen M. Knox, Nancy Laing, Peter Leslie, P. G. McBoyle, D. J. McCombie, Mary G. McDonald, Margaret J. McHardy, A. E. Macintosh, D. G. Mackay, N. R. Mackay, D. N. Mackinnon, A. I. Maclean, W. F. Macleod, Antoinette M. H. MacMahon, Ishbel M. Macrae, J. L. A. McVicker, D. W. Mathieson, Elizabeth H. Milne, C. G. R. More, R. E. P. Nutten, R. A. Peat, H. M. Raffan Sheila T. Ritchie, Marguerite M. Scott, W. G. Shiach, R. G. Simpson, W. D. Sinclair, J. A. M. Smith, A. L. Speirs, A. J. Spence, Laura B. C. Thompson, I. G. ..u, W. G. Todd and D. E. Walker.

Medical Honours

The following awards have lately been made to medical men:

GM.—Surgeon Lieutenant P. R. C. Evans, MB LOND., RNVR, for gallantry in services to the wounded after his ship had been damaged by an explosion. Enduring great pain and with both his ankles broken, Evans continued to tend the wounded for many hours.

DSC.—Surgeon Lieutenant R. H. Jones, MB, RNVR, for courage and resolution in pressing home a successful attack on enemy forces in enemy coastal waters.

RNVR Officers' Decoration.—Surgeon Commander W. T. R Chapman, MRCS, and Surgeon Lieut.-Commander S. B. Levy, LRCP

Mentioned in despatches.—Group-Captain C. J. S. O'Malley MB LOND., W. J. G. Walker, MRCS, Wing-Commanders R. M. Outfin LMSSA, and H. L. Willcox, MB NZ, Squadron-Leaders, J. A. Mains LRCPE, M. O. Richardson, MRCS, P. A. Gimson, MRCS, and J. F Houlihan, MB NUI.

The King has given authority to Dr. S. Avery Jones, medica officer in the Arab Legion, to wear the insignia of the fourt class of the order of El Istiqlal which has been conferred o him by the Amir of Trans-Jordan.

The President of the Republic of Poland has appointe Wing-Commander H. P. R. Smith MB CAMB., RAF, to be a officer of the Order of Polonia Restituta.

Medical Prisoners of War

The following officers have been posted as prisoners o war:

RAF Medical Branch (in Japanese hands).—Wing-Commande Donald Magrath, MB BIRM., Flight-Lieutenants D. A. Duthie, MB EDIN., F. A. Forbes, MB ABERD., C. B. I. Willey, BM OXFD, F. R. Philps, MB LOND., A. F. Rutherford, MB E MB LOND., L. C. Liddell, MB ABERD., B. A. Sto MB BELF., R. G. Blackledge, BM OXFD, John Connolly, LRCPI, B. L. N. Morgan, MRCS., J R. J. S. Wilson, MB DUBL., F. W. Parke, MB DUBL. and Maurice Kinmonth, MB LOND.

RAMC.—Lieut.-Colonel J. C. Collins, MRCS, Captain E. H. Markby, MRCS, Lieutenant E. C. Vardy, MD DURH., Captain R. B. Wallace, DSO, MC, MB GLASG., and Captain R. B. C. Welsh, MB EDIN.

University of Istanbul

Dr. Tevfik Sağlam has been appointed rector of th University of Istanbul.

Sağlam, who was born in 1882 in Istanbul, graduated from Asker Tibbiye (Military Medical School) when he was 21. He served a army hospital doctor in both the Balkan and the World War and rank of general. After working as chie ahanesi and as inspector of internal disease rbi (War of Independence) he became of medicine. He gave up teaching in 193 to practise as a specialist of internal diseases till last year h became third ordinary professor of internal diseases in the facult of medicine at Istanbul.

Paddington Medical Society

A meeting will be held on Tuesday, Oct. 12, at 8.45 PM, at St. Mary's Hospital, Paddington, W.2, when there will be a discussion on problems confronting the medical and pharmaceutical professions in war-time.

Infectious Disease in England and Wales

WEEK ENDED SEPT. 25

Notifications.—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 2772; whooping-cough, 1480; diphtheria, 757; paratyphoid, 14; typhoid, 3; measles (excluding rubella), 466; pneumonia (primary or influenzal), 356; puerperal pyrexia, 149; cerebrospinal fever, 49; poliomyelitis, 8; polio-encephalitis, 2; encephalitis lethargica, 4; dysentery, 270; ophthalmia neonatorum, 70. No case of cholera, plague or typhus fever was notified during the week.

The number of civilian and service sick in the Infectious Hospitals of the London County Council on Sept. 22 was 1828. During the previous week the following cases were admitted: scarlet fever, 246; diphtheria, 44; measles, 12; whooping-cough, 39.

Deaths.—In 126 great towns there were no deaths from measles, scarlet fever or enteric fever, 13 (1) from whooping-cough, 11 (2) from diphtheria, 61 (10) from diarrhœa and enteritis under two years, and 9 (1) from influenza. The figures in parentheses are those for London itself.

Liverpool and Birmingham each reported 5 deaths from diarrhœa.

The number of stillbirths notified during the week was 197 (corresponding to a rate of .31 per thousand total births), including 23 in London.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.

THYROTOXICOSIS TREATED WITH THIOUREA

H. P. HIMSWORTH, M.D. LOND., F.R.C.P.
PROFESSOR OF MEDICINE, UNIVERSITY OF LONDON,
DIRECTOR OF MEDICAL UNIT, UNIVERSITY COLLEGE HOSPITAL

In a recent publication Astwood (1943) reported the pronounced beneficial effects of thiourea and thiouracil in cases of thyrotoxicosis. According to him thiourea, in doses of 1–2 grammes daily, or thiouracil, in doses of 0.2–1 g. daily, caused, in the space of a few weeks, the disappearance of the thyrotoxic symptoms to such an extent that the patient could resume his normal activities and continue in good health as long as the drug was continued. After the administration of the drug there was a latent period of one to two weeks before the pulse began to fall. Thereafter it fell steadily towards normal and coincidentally the weight increased, symptoms of thyrotoxicosis abated, the basal metabolic rate fell and the blood cholesterol rose. As long as the drug was continued this improvement persisted but on omission of the drug the signs of thyrotoxicosis returned only to disappear again on the resumption of treatment. So far, in the considerable number of cases tested, no toxic effects of these drugs have been noted and no contraindication found to the continuance of the therapy for long periods. Further experience alone will show if thiourea and thiouracil are as innocuous as present experience suggests and also what the ultimate result of this treatment will be. The results at present available, however, are so striking as to indicate that in these drugs we have obtained therapeutic agents for the treatment of thyrotoxicosis superior to any we have hitherto possessed. The purpose of this paper is to report the full confirmation of Astwood's claims for the initial effects of thiourea on cases of thyrotoxicosis. Six cases have been treated, but it will suffice to report the effect of the therapy on one of the most severe.

ILLUSTRATIVE CASE

A young married man, aged 31, employed in a responsible position as the manager of a coal depot, was discovered to have thyrotoxicosis two years ago. He was treated with small doses of iodine and this treatment continued until his admission to hospital. For some months after beginning iodine he felt better but in March 1943, he contracted a respiratory infection and since then his symptoms have progressed rapidly. In this period his weight fell from 10 st. 7 lb. to 7 st. 8½ lb., despite the fact that his appetite was better than ever. He became irritable and nervous. The slightest exertion tired him and brought on palpitations. Sweating was pronounced so that during the day he would change his underclothes two or three times. Tremor of the hands appeared and was sufficient to incommode him. At night he could not sleep and he was troubled by consciousness of the rapid beating of the pulse in his head. Throughout this period he was having frequent and loose stools. Some weeks before admission his eyes became inflamed and he took to wearing dark glasses.

On admission the patient presented the classical signs of severe Graves's disease. He sat in bed tense and apprehensive. His movements were characterised by eagerness and excessive energy. The skin over the whole body was flushed and bedewed with sweat, there was a conspicuous tremor of the outstretched hand and the pulse was racing but regular, at 150 a minute. His staring eyes attracted attention. The sclerotic was visible all round the cornea. He was found to have well marked retraction of the upper lid and protrusion of the eyeball. The conjunctival vessels were injected and
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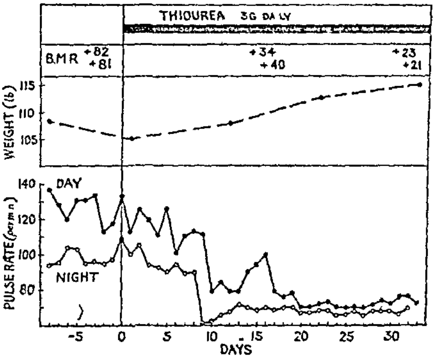
tion of he
thyroid ich
was eas of
pressure on the trachea. The gland was firm in consistency as would be expected after long continued iodine therapy.

The man's condition was so severe that the advisability of giving considerable doses of iodine immediately was debated but it was eventually decided to use sedatives only and he was given 15 minims of liq. morph. hydrochlor. four hourly. For 8 days the man's state continued unchanged and in this period two estimations of the basal metabolic rate gave values of + 81% and + 82%.

On the 9th day after admission the morphine was discontinued and administration of thiourea, 1 gramme three times a day, was begun. The results of this therapy are shown in the figure. It will be seen that it was not until the 11th day after thiourea was begun that there was a significant decline in the waking and sleeping pulse rates. Thereafter they declined rapidly and by the 18th day both reached normal levels. The rates remained normal for the remainder of the period of observation, even though the patient was allowed up and about. Before the commencement of this therapy his weight was still falling but after 33 days of therapy he had gained 9 lb. By the 15th and 16th days the basal metabolic rate had fallen to + 34% and + 40%, by the 31st and 32nd day it was + 23% and + 21%. In the same period the blood cholesterol had risen from 110 mg./100 ml. to 225 mg./100 ml. But the most striking effect of the therapy was on the man's clinical condition. By the end of the period a casual observer would not have noticed that he had thyrotoxicosis. His whole manner had changed; he was calm, collected and deliberate in his movements. The flush had left his skin, he no longer sweated and even the palms of his hands were dry. The tremor had disappeared completely. The staring eyes were no longer obvious. The lid retraction had gone, as also had the conjunctival injection, but on closer inspection it could be seen that the degree of exophthalmos was not significantly less. The goitre was softer—a finding explicable by the abstention from iodine—but it had not decreased in size and indeed measurement of the neck suggested that it was a little larger.



Effect of giving 1 g. of thiourea three times a day on the waking and sleeping pulse-rate, the weight, and the basal metabolic rate of patient with thyrotoxicosis

COMMENT

The results in the other cases were similar, but because of the milder nature of the disease less dramatic. All showed a latent period before the thiourea came into action and on the whole the decline in pulse rate was more gradual. On discharge from hospital the dose in each case has been reduced to 2 g. a day and no relapses have occurred. It is probable that further reduction in dosage will be possible. One case underwent thyroidectomy because the goitre was compressing the trachea. In this case thiourea alone was given and proved a satisfactory preoperative preparation. It is noteworthy that the tissue removed at operation was hyperplastic and practically free from colloid.

Only two disadvantages of this treatment have been found and these have proved trivial. Thiourea has a nauseating taste and at the beginning of therapy considerable nausea or even vomiting may occur. In each case this has disappeared on persistence with the treatment.
when t
second
it imparts to the breath. This appears to be more unpleasant to the observer than to the patient. Blood-counts taken during the course of treatment have shown no indications of agranulocytosis and the blood urea remained at normal levels.

As yet thiouracil has not been available for clinical tri[illegible] this substance advised by Astwood is [illegible] uiourea, and since its taste is much pleasanter it may prove to be the drug of choice in this condition.

MODE OF ACTION OF THIOUREA

The discovery of the action of thiourea on the thyroid gland was unexpected and for that reason the more credit is due to its discoverers for their alertness and the promptness with which they recognised the significance of their observations. J. B. and C. G. Mackenzie and McCollum (1941) were studying the effect of sulphaguanidine as an intestinal disinfectant and came to investigate its toxicity to the rat. They noted that animals dying after sulphaguanidine showed goitres and that on section the thyroid tissue showed hyperplasia and loss of colloid. This work was soon confirmed and it was further shown that other sulphur compounds, notably thiourea and thiouracil, had a well-marked goitrogenic effect (Richter and Clisby 1942). By a curious coincidence another group of workers arrived at the same conclusion from an entirely different starting-point. Kennedy and his colleagues in New Zealand were investigating the action of rape seed in producing goitre, and Kennedy (1942) was led to try the effect of allyl-thiourea. He discovered that it was actively goitrogenic. Since these discoveries, work to elucidate the mode of action of these thio compounds has been actively pressed forward. The results of these investigations have now been published (Mackenzie and Mackenzie 1943, Astwood et al. 1943) and throw considerable light on the matter.

When thiourea is given to rats two groups of effects are found: hypothyroidism and goitre. Clinically the animals show evidence of hypothyroidism by a falling basal metabolic rate, deceased growth and development, and a reduced appetite. Histologically the enlarged thyroid glands show hyperplasia and lack of colloid and resemble tissue from human cases of thyrotoxicosis. The classical work of Marine (1935), however, has shown that this histological picture does not necessarily indicate thyrotoxicosis; rather it should be interpreted, in the normal animal at least, as meaning that the thyroid gland is producing insufficient of the thyroid hormone for the needs of the body and is being stimulated to hyperplasia to remedy the deficiency. For example, Marine showed that such hyperplastic glands occurred in animals on an iodine-deficient diet and that their histological picture reverted towards normal when iodine was given. The explanation put forward is that on the deficient diet the tissues suffered from lack of the iodine-containing hormone; normally such a state is corrected through the agency of the thyrotropic hormone of the anterior pituitary gland which stimulates the thyroid gland to become hyperplastic and more active. But even a hyperplastic thyroid cannot manufacture the thyroid hormone without iodine, and so the stimulus *continues* and the hyperplasia intensified. When under such conditions iodine is given, the thyroid hormone is produced in quantity, the stimulus to hyperplasia of the thyroid abates and the gland reverts to its "resting" state.

It can easily be seen that the clinical state of hypothyroidism in association with a hyperplastic thyroid gland, such as occurs after administration of thiourea to normal rats, could be explained on the basis that thiourea neutralised the action of thyroxine in the body tissues. But such an explanation is immediately disproved by the observation that thyroxine has a normal action in animals under the influence of thiourea. It has also been shown that the condition of thyroid hyperplasia following administration of thiourea differs from the hyperplasia of iodine deficiency in that administration of iodine does not result in its disappearance and a return of the gland to the resting state. The question now arises: Is the hyperplasia of the thyroid tissue following treatment with thiourea mediated, as are other experimental thyroid hyperplasias, by the anterior pituitary gland? That this is the case is shown by the fact that hyperplasia after thiourea does not occur in hypophysectomised animals. It appears, therefore, that excessive secretion of thyrotropic hormone of the anterior pituitary gland occurs in animals treated with thiourea. We know, however, *that* when thyrotropic hormone is injected into normal animals it not only produces hyperplasia of the thyroid but also the condition of hyperthyroidism. The problem is why the hyperplasia after thiourea, which is apparently brought about by the agency of the thyrotropic hormone, is associated with hypothyroidism. The answer is given by *the observation that thiourea* prevents the development of hyperthyroidism which normally follows injection of this hormone while not preventing the hyperplastic effect of the thyrotropic hormone on the thyroid gland. The suggestion follows that thiourea prevents the synthesis of the thyroid hormone. Experimental evidence supporting this view has recently been produced by Geish (personal communication quoted by Mackenzie and Mackenzie 1943), who has shown that the colloid in the thyroid glands of animals treated with thiourea differs from normal thyroid colloid in being devoid of iodine.

These considerations provide theoretical grounds for suggesting the ultimate effect of treatment with thiourea. Marine (1935) has shown that hyperplasia of the thyroid gland, if unrelieved, ultimately gives way to atrophy with consequent hypothyroidism. It is possible therefore that long-continued administration of thiourea to human cases of thyrotoxicosis, in that it does not tend to diminish the hyperplasia but on the contrary has theoretical possibilities of intensifying it, may tide the patient over until atrophy of the gland supervenes and the state of thyrotoxicosis is thus cured by destruction of the source of the thyroid hormone.

SUMMARY

The claims of Astwood [illegible] ficial effect of thiourea or [illegible] been confirmed in six cases, [illegible] the drug is concerned.

The evidence at present available indicates *that* thiourea acts by interfering with the synthesis of the thyroid hormone.

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STERNAL PUNCTURE IN THE DIAGNOSIS OF MALARIA

G. J. AITKEN, M B GLASG, F R F P S
SQUADRON-LEADER RAF

(From an RAF Hospital in the Middle East)

It has been recognised for some time that examination of the sternal bone-marrow may help in the diagnosis of malaria, but the full value of this relatively simple procedure does not seem to be appreciated. This initial series of 105 cases may draw attention to its value and limitations as a diagnostic method.

METHOD

A sternal-puncture needle is unnecessary, a stout lumbar-puncture needle serving satisfactorily. It may if desired be cut down to about 2 in. and an adjustable stop with fixing screw can be fitted over the needle. All danger of serious penetration of the mediastinum can equally well be avoided, however, by means of a "distance piece" of glass or metal tubing, with a protective rubber buffer at each end, through which the needle is inserted, leaving only ½ in. of free needle. When it is used for diagnostic purposes only it is not essentia for the needle to be perfectly dry, so that any of the recognised methods *of sterilisation suffices.* No premedication is required, and with suitable local anæsthesia only minor discomfort is experienced by the patient, who should be lying flat, on a firm bed without a pillow.

The site is the centre of the sternum, at the level of th second interspace, easily localised just below the angle o Louis. The needle is inserted vertically through skin subcutaneous tissue to bone and firmly pressed through t cortex with small to-and-fro rotating movements, the bu resting on the thenar eminence and the needle being steadi with the index finger. The resistance decreases distinctly when the marrow is penetrated. The stilette is then removed and 0.5–1 c.cm. of marrow fluid aspirated. Films may be made directly or the fluid ejected into an oxalated tube and examined within half an hour.

Various other satisfactory methods of sternal puncture have been described, but the only one comparable in its simplicity is that originally described by Arinkin, in which a spinal puncture needle is inserted directly into the sternal marrow through the angle of Louis. The needle is inserted at an angle of 30° to the sternum and allowed to penetrate 0.5–1 cm. into the marrow cavity.

Properly prepared films stained by a Romanowsky stain covered with a thin layer of immersion oil and examined with the $\frac{1}{6}$ in. dry lens and a no. 2 ocular is the method of choice. Ring and other forms are easily detected and any suspicious object can be quickly scrutinised by the $\frac{1}{12}$ in. oil immersion lens. Long and tedious search of films is often necessary before any decision can be made, and preliminary examination of thick drop preparations is often helpful. The value of the thick drop method lies in the relative rapidity with which the probable result can be reached. In the present series no positive result was reported until search of marrow films had confirmed the thick drop findings. In the films no extracellular form was recognised as diagnostic.

PRELIMINARY EXPERIMENTS

To obtain a picture of the findings in the sternal marrow fluid in malaria, sternal puncture was performed in 10 cases with parasites in the peripheral blood. Counts were made of the relative numbers of erythrocytes containing parasites in peripheral blood and in marrow fluid, from films prepared simultaneously.

TABLE I—BLOOD FILMS AND MARROW FILMS COMPARED

Blood		Sternal marrow		
Parasite-containing reds in 5000 cells	Forms	Parasite-containing reds in 5000 cells	Predominant forms	Other evidence of infection
P. falciparum (%)		(%)		
0.4	Rings	1.5	Rings	Pigment, phagocytosed remains
0.8	Rings	1.6	Rings	
0.85	Rings	1.4	Rings	Phagocytosed remains, sch.
0.26	Rings	0.4	Rings	
0.75	Rings	1.15	Rings	Phagocytosed remains, pigment
P. vivax (%)		(%)		
0.06	Troph., gam., sch.	0.095	Troph., gam., sch.	Phagocytosed remains
0.35	Rings	0.85	Rings, sch.	
0.9	Troph.	1.1	Troph.	Pigment, gam.
0.08	Troph., gam.	0.13	Troph., gam.	
0.7	Troph.	1.1	Troph.	

Troph. = trophozoites. gam. = gametocytes. sch. = schizonts.

Table I shows that the marrow fluid in each case contained a substantially higher proportion of parasite-containing cells. I realise that these proportions are not necessarily applicable when parasites are very scanty, but it is reasonable to assume that any change will be in favour of a higher proportion in the bone marrow.

DIAGNOSTIC SERIES

Sternal puncture was performed in the 95 cases described below only when serial thick drops taken at six-hourly intervals had proved negative. In all cases further blood thick drop examinations were made at the time of the sternal puncture, and in 10 cases, blood concentrates, prepared by Bass and John's method of repeated centrifugalisation, were examined. In one case only was a positive finding recorded, and that in a case positive to sternal puncture. It was not considered justifiable to subject the patients to the intravenous injection of adrenaline in saline or to other severe provocative measures, but of 12 cases in which subcutaneous injection of 1 c.cm. of adrenaline had been tried with negative result 3 proved positive on sternal puncture. In a further 5 cases with negative sternal puncture later injection of adrenaline and examination of serial thick drops at half-hourly intervals gave no positives (table II). It is evident from the figures that examination of sternal marrow fluid is significantly more efficient than the other methods tested.

TABLE II—RESULTS OF DIFFERENT METHODS COMPARED

	Examination			
	Thick drop	Concentration methods	Provocative adrenaline	Provocative adrenaline after sternal puncture
	At time of sternal puncture			
Cases	95	10	10	
Positives	1	1	0	[illegible]
Positives by sternal puncture	35	6	3	

This series of 95 falls naturally into two main groups. Into the first group are those cases which clinically merit a diagnosis of malaria, but in which repeated examination of the peripheral blood has shown no parasites. Most of this group consists of patients who have been taking suppressive quinine until admission or shortly before. In such cases it is not uncommon to find that parasites appear in the blood, if they appear at all, only *after one, two, or more days in hospital under observation.* Sternal puncture elucidates the diagnosis in most of these cases. Of the 6 cases with negative sternal puncture diagnosed and treated successfully as malaria 2 have been on full antimalarial treatment for 30 and 40 hours before sternal puncture was performed.

The second group consists of clinically atypical cases having a history of exposure to infection, not necessarily recent, in whom routine examination of the peripheral blood has proved negative. Patients in whom latent malaria is wakened to activity, but is completely overshadowed clinically by some superadded disease, form a subgroup worthy of separate mention; 3 cases of this

findings in the two main groups were as shown in table III.

TABLE III

	Clinically malaria	Clinically atypical
Cases	35	60
Average age (years)	26.4	25.4
Negative thick-drop examinations (average no.)	6.6	8.0
[illegible]	26	13
[illegible] ll after treat[illegible]	8	35
[illegible]	0	4
[illegible] with quinine	0	
[illegible]	3	45

CLINICAL PATHOLOGY

Only those bone-marrow findings of significance in the diagnosis of malaria will be discussed. With one exception, in which pigment was the sole positive finding, only those forms commonly present in the peripheral blood were diagnostically important. Intracellular pigment particles, other phagocytised sporozoal remains, and the more mature trophozoite forms and schizonts

would consistently reveal mature forms of *P. falcipa*
as well as evidence of parasite destruction, but this
advantage does not justify the more elaborate
which it would entail. The findings in relat
clinical picture at the time of sternal
beyond the scope of this article, but it
note that no malignant tertian gamet
in the sternal marrow fluid of th
malaria in the series though it
presence was expected. This fi
with Plehn's statement that

number in malaria in the tropics, though often seen in such cases in England.

Marrow reticulocyte and differential counts, using supravital staining methods, have not been proved to hold any advantage over the corresponding peripheral blood examinations. Actively motile primitive monocytes were seen in one case with a blood mononucleosis of 19%. The significance of this finding is at present obscure. Fresh wet films of sternal marrow fluid were examined in each case but this method was found of little diagnostic value when parasites were scanty.

Artefacts.—Marrow films contain numerous small protoplasmic masses which superficially resemble sporozoa. Platelets, many aberrant in form, are more numerous than in the peripheral blood and are a fruitful cause of difficulty. Singly they may resemble rings or the gametocytes of *P. falciparum* and in clusters merozoites. A Howell-Jolly body, by no means a rare finding in the marrow, if lying towards the edge of a ring-stained erythrocyte is easily mistaken for the chromatin of a ring form. Basophilic red cells, often large, irregularly stained and stippled may present puzzling appearances and resemble erythrocytes containing Schuffner's dots and badly stained trophozoites. Rounded-off portions of disintegrated myeloid cells containing small reddish-staining particles or clusters of swollen and degenerated myeloid cell granules may on first inspection be interpreted as stages in the development of schizonts. The non-specific nature of these artefacts is usually easily recognised by the absence of any hæmozoin and of a containing erythrocyte.

Thick-drop examination naturally holds out better prospects of finding scanty malaria parasites in the marrow fluid, but there are a number of limitations to this method; the parasites are often distorted and when they are scanty, it may be hard to locate an unequivocal form, while—especially in preparations stained by Field's method—the trophozoites and gametocytes of *P. vivax* can often be recognised only with difficulty, being easily overlooked as cellular detritus amid the mass of marrow cells. In thick-drop preparations artefacts present greater difficulties; the basophilic erythrocytes appear as slightly reticular masses stained a dull blue by Field's or Giemsa's method, and if a platelet or other red-stained body is superimposed upon one it may easily be mistaken for a malarial trophozoite.

DISCUSSION

It is possible that a somewhat distorted picture of the importance of the type of case under review results from the fact that the patients were drawn from a body of young men, physically exceptionally fit and mostly on suppressive quinine, in whom considerable resistance to the free multiplication of the malaria parasite might be expected, even under the debilitating influence of some concurrent disease. In these circumstances, however, there may be a delay of up to several days before specific treatment is begun, if diagnosis has to be based on clinical observation. It may even be justifiable to proceed directly to sternal puncture in every case after a limited number of negative blood-slides. Over a period of time this would save much bed space in hospital, shorten the time lost by highly trained personnel and increase the comfort of patients by ensuring earlier treatment.

The second group illustrates the variety of the possible clinical manifestations of malaria and the importance of excluding malarial infection by all possible means in every case of pyrexial illness in the tropics in which the slightest suspicion exists. In a series of 250 cases of malaria, 46 gave a history of a short pyrexial illness with negative blood films within 3 weeks of admission. The illnesses had been labelled variously nasopharyngitis, tonsillitis, coryza, sandfly fever, dengue fever, gastritis, enteritis, heat exhaustion, and PUO. Of 250 unselected hospital patients questioned, only 18 have a similar history. In the absence of opportunity to test the question by a controlled series, it is interesting to speculate on the proportion of such cases in which malarial parasites would have been demonstrated by sternal puncture.

CONCLUSIONS

Sternal puncture is simple and easily performed. In ria the parasites and their metabolic-disintegration products are more numerous in the sternal bone-marrow than in the peripheral blood.

Examination of sternal marrow fluid is of value in the diagnosis of malaria and should be carried out in cases in which repeated examination of the peripheral blood is negative. It elucidates the diagnosis in a number of cases of obscure illness.

The interpretation of stained preparations of sternal marrow fluid, especially thick drops, is not a responsibility to be undertaken lightly by the inexperienced.

STERNAL PUNCTURE IN THE DIAGNOSIS OF MALARIA

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Examination of peripheral blood is the keystone of malarial diagnosis, and where there is free sporulation in the peripheral blood there is no better method. There are some cases, however, in which the peripheral-blood parasites are so scanty as to be absent for practical purposes, and in which serial blood films are a source of hope rather than certainty. In an unselected series of 294 cases of malaria treated at this hospital, 256 were diagnosed from peripheral-blood examination, the remaining 38 revealed the parasite only by sternal puncture. Of the latter cases, many were so atypical as to have obtained such provisional diagnoses as neurasthenia, affective disorder, sandfly fever.

Serial blood-drops taken from them and stained by Field's method proved consistently negative, yet a positive diagnosis of malaria was readily made by the demonstration of parasites in the sternal marrow fluid. This accessory method in diagnosis of malaria has enabled a heterogeneous group of apparently unrelated illnesses to receive appropriate diagnosis and treatment. While this group forms only a small part of the total malarial casualties, it is one which is associated with much hospitalisation until the underlying malarial pathology is appreciated. These considerations have prompted us to indicate the value of sternal puncture in the diagnosis of such cases.

These cases comprise two main groups: Group A, latent or chronic malaria; and Group B, acute primary malaria.

GROUP A, LATENT MALARIA

This group has been a recurring problem in the Middle East, which though relatively healthy itself, has a shifting service population from hyperendemic areas in tropical Africa. They provide a source of subtertian malaria normally alien to the Middle East, where the indigenous illness is benign tertian malaria. Both varieties, however, provide instances of latent illness which are problems for diagnosis. Such cases are notoriously protean in character, but most of them fall naturally into three types which are conveniently described by case histories.

Type 1.—Obscure illness. The course of the illness may be long, the symptoms mild and vague. Such symptoms are a debility of insidious onset, accompanied perhaps by occasional headache, loss of weight, and in some instances by syncopal attacks. The patient may run an irregular low-grade pyrexia of 99° F in the evenings, but this is not a constant finding. There may be no history of previous malaria or sandfly type pyrexia. There is nothing on clinical examination, or in the blood findings, to suggest the malarial infection which is revealed by sternal puncture.

Case 1.—Nursing orderly, aged 24. Benign tertian malaria (BTM) in August, 1940; routine cure. November, 1940, and July, 1941, treated for acute gastritis, but from the description of these attacks they may have been recurrences of malaria. He was symptom-free until March, 1942, when he noticed that he was feeling off-colour but had no definite symptoms. This general debility persisted through the summer until October, 1942, when he started to get headaches and occasional transient temperatures of 99° F in the evenings. On Oct. 29, after walking downstairs, he had a syncopal attack, fell and hurt his hip and elbow. This attack was not witnessed, and though he does not know how long the coma lasted, probably it was only a few seconds. On examination, temperature 99° F, no abnormal physical signs discovered in any system. Blood-pressure 140/88 mm. Hg. No abnormalities in complete blood-count, nor were any parasites seen. Sternal puncture demonstrated BT-rings. He recovered his previous good health after completing a full course of treatment.

CASE 2.—Pilot, aged 22 No previous history of malaria. Not previously stationed in a highly malarious district. *Admitted on July 30, 1942. Treated for acute rheumatic* polyarthritis which responded well to salicylates, but at a later date he developed mortic reflux. On Aug. 28 he developed a low-grade pyrexia, with associated mild polyarthritis, which was salicylate-resistant. Nine consecutive blood drops were negative for malarial parasites. Sternal puncture demonstrated the presence of BTM trophozoites and gametocytes in the marrow The condition responded immediately to quinine.

Type 2.—Cases in which symptoms are predominantly psychological, presenting as neurasthenia or affective disorder.

CASE 3.—Pilot, aged 22. He had a good service record and had been awarded the DFC. Stationed for a week in *April, 1942, at a coast town in a highly malarious district.* About two weeks later gradual onset of anorexia, headaches and occasional vomiting. These symptoms progressed, and he was therefore admitted to hospital for investigation on July 15. He had lost 15 lb. in weight over the period. Physical examination disclosed no abnormality except for *the loss of weight. Spleen not palpable.* Mentally he was apathetic, uninterested in his work and suffering from insomnia. His whole picture simulated an anorexia nervosa. Investigations (including barium meal, fractional test meal, and stool examination) negative. His blood sedimentation rate, however, was raised to 45 mm. in an hour (Westergren) [illegible] temperature around [illegible] Sternal puncture [illegible] *ciparum.* Routine treatment was followed by complete recovery from both physical and mental symptoms. After he had been discharged from hospital he felt so well that he volunteered for particularly hazardous duties.

CASE 4.—Pilot, aged 38, with a good service record and, as far as could be ascertained, no clear predisposing neurotic trends He complained of mental depression, lassitude and loss of interest in his work, for which he no longer felt confident. He had suffered from insomnia for several weeks, and the picture was that of a mild depressive state. He had been in and out of malarial country for many months and had [illegible] and returned to duty with zest and enthusiasm.

Type 3.—Self-limited short-term fevers without positive blood findings. These may have been diagnosed as sandfly fever, or as clinical relapsing fever if there is a history of previous attacks at short intervals. The medical histories of these cases often show several previous admissions, each of short duration, to various hospitals.

CASE 5.—Test pilot, aged 26. No history of malarial illness, but during the previous 3 months he had been in two *different hospitals suffering from "sandfly" fever.* He had felt quite well in the interval. He was admitted at the end of 3 days' pyrexia considered to be an attack of sandfly fever. Serial blood-films taken over 2 days showed no malarial parasites, and he claimed to feel quite well. Sternal puncture revealed ring-form parasites, the type was not determined, but was probably *P. falciparum.* The spleen was not clinically enlarged. The only positive sign was a subtertian type of temperature of 99° F.

CASE 6.—Pilot, aged 24. Stationed in a malarious area, but not taking any prophylactic quinine One month before admission treated in a hospital for sandfly fever. Soon after discharge complained of diarrhœa, no associated blood or mucus in the stools and no tenesmus. Admitted to hospital [illegible] All routine tests negative. [illegible] temperature of 99° F. Ten [illegible] Sternal puncture showed MTM rings. His intestinal disturbances subsided completely under malarial therapy.

CASE 7.—Pilot, aged 22. Had arrived, 4 days before admission, from an highly malarious district. Had been taking prophylactic quinine. Seven weeks before, while in *that area, treated for* "cough and bronchitis," 3 weeks before treated for bronchopneumonia with sulphonamides. Admitted complaining of recurrence of cough and malaise. X rays of chest showed pneumonic areas. Six serial blood slides were negative. Sternal puncture showed MTM rings Rapid recovery after routine malarial treatment. The *earlier attacks of bronchitis and bronchopneumonia* were almost certainly malaria, suppressed by quinine, with respiratory complications.

GROUP B, ACUTE PRIMARY MALARIA

These cases had primary pyrexia compatible with malaria, but though they were commonly treated as such, they could not be proved positive by peripheral-blood examination.

CASE 8.—Clerk, aged 26, stationed in an area where primary malaria is uncommon Had been perfectly fit. No prophylactic quinine taken and no antimalarial measures practised Admitted to hospital after two days' headache, malaise and shivering. Temperature swinging to 105° F Spleen not palpable. Seven serial blood-slides negative. Sternal puncture revealed BTM rings Rapid response to routine treatment.

CASE 9.—Pilot, aged 25. Stationed in a malarious area for a month before admission. Admitted on account of frontal headache, malaise, and tertian type fever. Spleen palpable. Six serial blood slides and a blood concentration test failed to reveal malarial parasites. Sternal puncture demonstrated MTM rings No suppressive quinine before admission Responded to routine treatment.

CONCLUSIONS

Sternal puncture is accessory to examination of peripheral blood, and does not replace it.

It is of espec [illegible] presenting as o [illegible] diagnosis for [illegible] Most *pyrexial* malarial cases can be diagnosed by examination of the peripheral blood, but sternal puncture offers a supplementary way of diagnosing those cases where sporulation is so scanty that peripheral blood parasites seem to be absent.

GASTRODUODENAL HÆMORRHAGE
TREATED MEDICALLY
WITH ENTHUSIASTIC BLOOD-TRANSFUSION

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FIGURES for the mortality from gastroduodenal hæmorrhage published during the last 10 years vary enormously. In publications from many places (e.g., Finsterer 1930, Blackford and Williams 1940, Bohrer 1941, Walters and Cleveland 1941, and Gordon-Taylor, 1937–8), where the results of medical treatment have not been entirely satisfactory, surgery has been advocated. This form of treatment is, however, not generally desirable. As Professor Witts has said, "Every surgeon cannot be a Finsterer."

In the present series of cases, most of them severe, *treated entirely medically—with complete rest, morphine* when necessary, a modified [illegible] and vitamin C—the results [illegible] been in large measure due [illegible] and enthusiastic transfusion treatment adopted in the severe cases. This form of treatment has only recently become possible in virtue of the greatly increased supplies of blood for transfusion now available with the system of widespread blood-storage by the War Emergency Blood Transfusion Services On account of these encouraging results obtained by this new form of treatment, this series of cases, although small, was thought worthy of report

Accurate classification of hæmatemesis is impossible and hence most of the published statistics are not comparable. In this instance, we have followed Witts in grading all cases of multiple hæmorrhage as severe;

single hæmorrhages were also regarded as severe if signs of secondary shock were produced and particularly if the shock had been allowed to persist.

Where frank signs of established shock (usually manifested by pallor, sweating, coldness, cyanosis and disturbance of pulse-pressure or fall in systolic pressure) were present, the cases were given whole blood at a moderately rapid rate—e.g., 500 c.cm. per half hour, until there was clinical improvement, paralleled by a rise in systolic blood-pressure to 100 mm. Hg or a restoration of a more normal pulse-pressure. The transfusion was then slowed to a drip-rate of 40 to 60 drops a minute. Cases not showing the clinical phenomena of shock but with a hæmoglobin below 60% (Haldane) were transfused at a drip-rate throughout either with whole-blood or concentrated red-cell suspension (MacQuaide and Mollison 1940). For all cases, blood stored in the standard sodium-citrate glucose anticoagulant (MRC War Memorandum 1940) for 2 to 14 days was used.

CASES TREATED

In the last 12 months 30 cases (16 men and 14 women) of hæmorrhage were admitted to a general hospital. Some were too mild to need transfusion, but all cases of hæmatemesis or melæna, or both, were treated by the above routine. They have been classified in the table.

Age	Hæmorrhage	
	Mild or moderate cases	Severe cases
30–40	3	8
40–50	3	3
50–60	1	3
60–73	4	5
Total	11	19
Transfused ..	2	19

The cases fell into 4 clinical groups:

1. Single hæmorrhage without shock, 11 cases.
2. Single hæmorrhage with shock, 2 cases.

CASE 1.—Woman aged 37, with a 4 years' history of vague dyspepsia, had a large hæmatemesis in the hospital. After an hour's conservative restorative treatment, she was still, pale, cold and clammy; blood-pressure 100/50 mm. Hg, Hb 84%. She was given 500 c.cm. of blood in $\frac{3}{4}$ of an hour and a further 500 c.cm. in the next 2 hours. There was a satisfactory rise of blood-pressure. An uninterrupted recovery followed. Final (gastroscopic) diagnosis: multiple gastric erosions.

3. Multiple hæmorrhages in a young person (age less than 45). There were 8 cases, of which the following is typical.

CASE 2.—A man aged 35, with a 5 years' history of peptic ulcer vomited a pint of blood at home; Hb on admission 95%; BP 125/90 mm. Hg; 36 hours later he vomited 3 pints of blood. BP 90/70 mm. Hg. He was given 500 c.cm. of blood in half an hour. The BP rose to 105/60 mm. Hg; a further 1000 c.cm. of blood was given at a drip rate. The next day he received 500 c.cm. of a concentrated red-cell suspension. On the next day he had another hæmatemesis and another transfusion. On each of the next four days he had several hæmatemeses of $\frac{1}{2}$–2$\frac{1}{2}$ pints, and each day was transfused accordingly. His Hb was 50–65% during this time and the BP satisfactory. For the next 4 days he was not transfused and had no hæmatemeses but persistent melæna. The Hb fell to 35%. He was therefore given 1000 c.cm. of concentrated red-cell suspension, Four days later, his Hb had again fallen from 65% to 50%. A further transfusion of concentrated red-cell suspension (1000 c.cm.) raised his Hb to 80%, after which he made an uninterrupted recovery. Within 15 days he had received 9000 c.cm. of whole blood and 4000 c.cm. of concentrated red-cell suspension. Final (radiological) diagnosis: chronic duodenal ulcer.

4. Multiple hæmorrhages in an elderly person (with or without hyperpiesia): 8 cases.

CASE 3.—A woman aged 73, with a many years' history of peptic ulcer, had a hæmatemesis of 2 pints at home. On admission her BP was 140/90 mm. Hg, Hb 55%. She was ven 500 c.cm. of whole-blood slowly, but continued to vomit small amounts of blood. The next day she received a further 1000 c.cm. of blood. The following day her Hb was 70% and her BP 190/100 mm. Hg. She made an uninterrupted recovery; the hypertension persisted. With a barium meal no ulcer was seen, but there was extensive calcification of the splenic artery.

The only death in this series occurred in this group.

CASE 4.—A woman aged 71 with no previous history of dyspepsia. On the day before admission she vomited 2 pints of mixed blood and food. Her condition was satisfactory for 48 hours after admission. She then had a small hæmatemesis and another the following day, BP 90/45 mm. Hg, Hb 57%. She was given 1000 c.cm. of blood, but the Hb at the end of transfusion was only 60%. The following day she was therefore given 500 c.cm. of concentrated red-cell suspension. The day after that she had another hæmatemesis and another transfusion, after which her condition was good for 48 hours. Another series of hæmatemeses followed with severe signs of shock; 2500 c.cm. of blood were given in 20 hours; all signs of shock disappeared and the Hb was 65%; 24 hours later, however, the hæmorrhages were repeated with profound collapse. With heroic transfusing her BP was raised gradually from an unreadable figure to 110/60 mm. Hg, and Hb to 80%, 4000 c.cm. of blood being given in 19 hours. She died suddenly [illegible] hours later. At autopsy one doubtful er[illegible] high up on the posterior wall of the stomach. It overlay a pale nodule about 3 mm. in diameter. Histologically this proved to be an erosion of the mucosa over an abnormally large submucous artery which had perforated, the nodule being a fibrin clot. The artery was otherwise histologically normal. The most notable post-mortem lesion was a severe confluent central necrosis of the liver, presumably due to anoxæmia resulting from the unduly long state of collapse the day before death. The lungs were dry.

DISCUSSION

"Blood transfusion correctly applied is the most important single factor in saving life in severe gastrointestinal hæmorrhage," was the opinion expressed by Bennett and his colleagues (1942).

Ideally this treatment should be controlled by repeated blood-volume estimations. In practice skilled personnel is required for the determinations, and reliable methods—except perhaps that of Crooke and Morris (1942)—are not sufficiently rapid. Moreover, if bleeding begins again after the dye has been injected, more dye must be given to form a new base line. With Evans's blue only a maximum of 150 mg. in divided doses is permissible. This maximum may well be reached in 48 hours. Also, the best methods, assuming they are accurate, measure only the volume of circulating plasma. It is possible that variations in the volume of non-circulating plasma may be of importance in cases of shock secondary to hæmorrhage.

In the absence of blood-volume estimations the indications for transfusion usually cited (e.g. by Witts 1937) are a systolic blood-pressure of less than 90 mm. Hg, a pulse-rate greater than 140, a blood-urea greater than 100 mg. per 100 c.cm. and a hæmoglobin of less than 40%. Human subjects however vary so greatly in their responses to all forms of injury or disease that in clinical medicine it is impossible to lay down hard and fast rules. Grant and Reeve (1942) studying air-raid casualties in which "hæmorrhage plays an important part but is not the sole factor involved" could find no constant sign which could be taken as a measure of severity. Figures are, therefore, notoriously fallible and if quoted must allow the widest possible margin for safety. In the case of hæmorrhage, a patient can be profoundly shocked and yet his systolic pressure may be well over 90 mm. Hg, even above 150 mm. Hg, depending in some measure upon the systolic pressure prior to the hæmorrhage, a figure which often is not known. An equally important figure is the pulse-pressure. The pulse-rate by itself is not so important as an indication for transfusion. Many of our severe cases, even at their worst, never had a pulse-rate above 140; the degree of tachycardia was often not proportional to the severity. The figure for the blood-urea given by Witts is also, in our opinion, high.

We prefer, therefore, not to diagnose shock in terms of figures for blood-pressure, &c. The diagnosis in the present state of knowledge is a clinical one: it may well vary with the individual observer. It is our experience [illegible] does not [illegible] does so [illegible] been too long established.

Cases with clinical signs of shock were transfused rapidly to avoid the irreversible changes seen in tissues *subjected to prolongation of this state (Dunphy et al.* 1941). This procedure raises the blood-volume towards normal and thus increases the renal blood-flow and tends to reduce azotæmia (Black 1942). It has been claimed that this practice by increasing the blood-volume and pressure dislodges the thrombus in the bleeding vessel and [illegible]. There has never been any e[illegible] [illegible] it has also been claimed that [illegible] arteriosclerotic arteries of the elderly, and of the arteries in the bases of penetrating ulcers is deficient. In the present series hæmostasis was, with one exception, well maintained in the elderly, and in this case the artery was histologically normal. Although it appears established in the United [illegible]; Blackford and Williams 1941) that the mortality [illegible] most of the really disturbing hæmorrhages in this series occurred in the age-group under 45. *Several of the cases were found by* gastroscopy, 3–4 weeks after the cessation of the hæmorrhage, to have large penetrating ulcers.

Bennett and his colleagues (1942) quote figures to show that the drip-rate of transfusion at least does not tend to rest[illegible] [illegible]te that the exclusion of [illegible] has eliminated dange[illegible] series there were no pyr[illegible] as to cause anxiety. *The criticisms of Hurst and Ryle (1937)* are thus answered.

When the subject is not in a clinical state of shock but is anæmic as a result of the hæmorrhage, transfusion is again indicated, not only for the correction of the existing anæmia but also as an insurance against a further hæmorrhage, which may be of such severity as would be well withstood by one with a relatively normal blood-content but not by a debilitated anæmic person.

The most generally available guides to the severity of the anæmia are hæmoglobin determinations, but these are so fallible that with their use again a wide margin of safety must be allowed. We recommend the transfusion of all cases with a Hb below 60%. On occasion, this figure may be obtained with a red-cell volume of 700 c.cm., the lowest safety limit set by Bennett and his colleagues. Here again it is our experience that transfusion does nothing but good. The circulating hæmoglobin is restored to a more or less normal level and the dangers of anæmic anoxia of vital tissues, such as the brain and myocardium, are avoided.

With repeated bleeding, the transfusion should be repeated as often as the bleeding, or as often as will keep the Hb greater than 60% (e.g. case 2; or another man who received each day for 9 days 500–1500 c.cm. of whole blood or concentrated red-cell suspension, a total of 4 litres of blood and 5 litres of red-cell suspension).

For the cases transfused the average number of donors required for blood or red-cell suspension was 9 (range 2–31). In these cases of persistent bleeding the hæmoglobin level can be maintained for long periods by these massi[illegible] and C[illegible] show[illegible] a you[illegible] red-cell suspension from 103 donors.

For the slow persistent bleeders it seems safe to give up to 1½–2 litres per day at a drip rate. When the blood-volume is depleted by intercurrent hæmorrhages larger amounts may be required (e.g. case 4).

The treatment of mild hæmorrhage, especially in young patients, appears to be universally accepted as [illegible] the hæmorrhage [illegible] severe hæmorrha[illegible] the paucity of surgeons practised in operating on such cases. Again, except in a few instances, the statistics of medical treatment are at least as good as those of surgical treatment, and improvement in transfusion tactics and supplies have added greatly to the physician's armamentarium. Surgery appears to be indicated *only* in special clinics or where there are additional indications such as obstruction or perforation.

SUMMARY

A small series of 30 cases, 19 of them severe, of gastro-duodenal hæmorrhage have been treated entirely medically.

The severe cases were transfused much more enthusiastically than is usual, and clinical results were highly satisfactory. There was only one death.

Indications are given for transfusion.

We should like to thank Dr E. B. Brooke and the nursing staff of St. Helier Hospital, for their great help and cooperation.

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INTRACISTERNAL INJECTION OF POTASSIUM PHOSPHATE

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AT the Academy of Sciences in Moscow, Stern (1942 a, b) has advocated the use of potassium phosphate in [illegible] potassium phosphate (equivalent to 3–4 mg. potassium) into the cisterna magna. Blood-pressure rose to normal in 30 seconds and respiration and reactivity became normal. Furthermore, shock following hæmorrhage could be combated by potassium injection without transfusion. Few details are given (e.g., there is no record of the anæsthetic used or the criteria of shock), but on the basis of these experiments a technique for stimulating " exhausted sympathetic centres " by potassium phosphate injected intracisternally into man is described. The Russian workers claim that this procedure *has proved its value in the field, although* the usual methods of treatment are employed at the same time.

It is generally recognised that potassium salts in small quantities excite and in larger doses depress nervous tissue, but there have been few records of the general effects of applying the ion to medullary centres. Stern and Chvoles (1933) found that intracisternal injection of potassium chloride caused a rise of carotid blood-pressure, con[illegible] Hermann and other[illegible] salt intracisternally [illegible] of carotid blood-pre[illegible] medulla. The pressor response persisted after bilateral adrenalectomy with bilateral vagotomy. In 1941 Stern reported that injection of potassium salts into the cerebral ventricles of various animals caused a well-marked rise of blood-pressure, augmented respiration and increased muscle tone. Ainslie and Dax (1942) *followed blood-pressure changes, presumably in the* arm, of 3 psychotic patients, not shocked or bled. Of 11 injections carried out according to Stern's directions, only one was followed by significant rise of pressure. In 6 cases there was a transient fall, accompanied by slowing of the heart by as much as 45 % of the initial rate. The sequelæ included nystagmus and sweating; respiratory activity was said to change very little even when other signs were pronounced.

In the experimental work no reference is made to the height or duration of the pressor effect. There is also some inconsistency in the effects on blood-pressure and respiratory activity. The following work aimed at investigating in more detail, first, the effects of intracisternal injection of potassium phosphate on the cardiovascular and respiratory systems; secondly, whether hæmorrhage altered the responses; thirdly, whether injection of a large dose would permanently damage the brain stem.

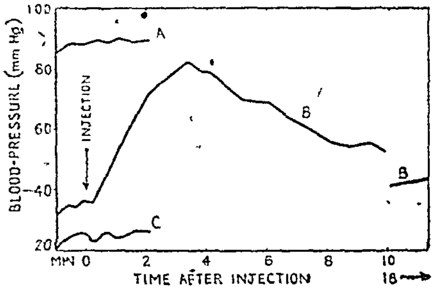

Fig. 1—Rise of mean carotid blood-pressure after intracisternal injection of 0 05 ml. potassium phosphate solution. Pressure had been previously lowered by rapid bleeding from femoral artery.

A. Initial BP.
B. Response to potassium phosphate after bleeding.
C. Response to control injection of 0·05 ml. normal saline intracisternally after bleeding.

METHOD

Adult rabbits were anæsthetised by injection of urethane or pentobarbital solution into an ear vein. Carotid blood-pressure was recorded by mercury manometer or optically. The latter method allows of accurate counting of heart-rate. Respiration was recorded by a balloon strapped to the epigastrium and connected to a tambour and writing lever. For optical records it was simpler to connect a sensitive tambour carrying a mirror to a side arm of the tracheal cannula. Injections into the cisterna magna were made with a hypodermic needle pushed through the atlanto-occipital membrane. In later experiments we punctured the membrane with a wide-bore needle and left it in position during the experiment; solutions were injected along a fine needle passed into the larger one. This procedure entailed reduction of the cerebrospinal fluid pressure to atmospheric, puncture of the membrane being signalled by the escape of about 0·5 ml. of clear colourless fluid. Autopsy confirmed the entry of the needles into the cisterna magna and the absence of damage to the medulla. The animals were bled from a cannula in the femoral artery or from the carotid cannula itself.

The following solutions of potassium phosphate were used: (*a*) $\frac{1}{6}$ molar potassium dihydrogen phosphate diluted with $\frac{1}{6}$ molar potassium hydroxide to pH 7·6 (colorimetric); (*b*) $\frac{1}{6}$ molar phosphoric acid diluted with potassium hydroxide to pH 7·6, provided sterile in 1 ml. ampoules.

RESULTS OF INJECTION WITHOUT BLEEDING

Intracisternal injection of potassium phosphate caused alteration of blood-pressure, respiratory activity and tone of skeletal muscle.

Blood-pressure changes.—Carotid blood-pressure increased after a latent period of $\frac{1}{2}$–1 minute. This change was usually slow, and followed by a slower fall to the initial level (cf. fig. 1). The average duration of the pressor effect was about 15 min.; only rarely was the effect prolonged up to 45–60 min. Rise of blood-pressure is not a constant result of the injections. Of 57 injections which caused alterations of respiratory and skeletal muscle activity, 35 caused a rise of blood-pressure; in 20 the rise was 20–40 mm. Hg, and in one animal 78 mm. Hg. The rise was often preceded by a transient sharp fall, which began about 5 sec. after injection and lasted 1–2 min. Some animals showed only the depressor effect, without subsequent pressor effect. We could observe no cause for this variation in response to the injection, but it is possible that the anæsthetic was a contributing factor. The initial fall of pressure was accompanied by slowing of the heart. Section of both vagus nerves in the neck did not modify the fall of pressure (fig. 2). Alterations of reactivity of the animals y have masked any quantitative change due to the section, but our results do not suggest this. The form of the pressure tracing and the slowing of the pulse were similar before and after vagotomy.

Respiration.—After a brief latent period respiration became quicker and deeper. These changes were noticeable before any alteration of blood-pressure occurred, and served as a useful index that the injection had been effective; indeed the first respiration after the injection was altered. After rapidly increasing to a maximum in $\frac{1}{2}$–2 min., breathing gradually returned to normal; as a rule the respiratory change lasted as long as the blood-pressure change, although there might be no pressure change in spite of respiratory alteration. Hyperpnœa accompanied both fall and rise of blood-pressure. With larger doses respiration might be inhibited for a few cycles, but always increased subsequently. In one animal, under deep pentobarbital anæsthesia, the injection was followed by so long an inhibition that artificial respiration was necessary.

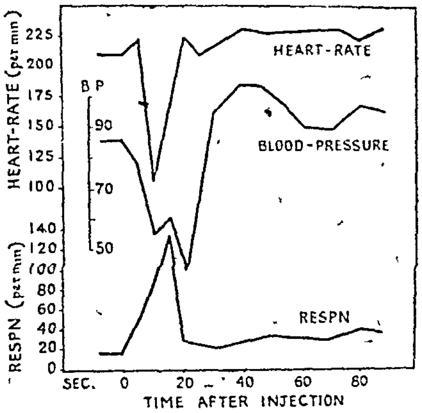

Fig. 2—Change of carotid blood-pressure, heart-rate and respiration-rate after intracisternal injection of 0 02 ml. potassium phosphate solution without bleeding. Vagi cut in neck.

Skeletal muscle.—Tone of voluntary muscle increased. The smallest effective injection caused increased tone and slight tremor of shoulder muscles. With increased dosage the signs were more widespread, notably head-retraction, strong extension of the limbs, deviation of the eyes and constriction of the pupils. Convulsions might supervene quickly, being preceded by strong flexion-extension movements of the limbs. The convulsions lasted only a minute or two but the muscle tone decreased very slowly. The latent period of these tonus changes is very short, tremors of muscles preceding any blood-pressure change.

Control.—The alterations of body activity are not due to intracranial pressure changes. Control injections of normal saline produced no significant alteration of blood-pressure or any other visible effect.

Section of spinal cord with bilateral vagotomy decreased the responses considerably, but did not entirely abolish them. When the cord was cut across between the first and second cervical roots and both vagus nerves were cut in the neck a slight fall of blood-pressure was followed by a slight rise which persisted. The alterations were not greater than 5 mm. Hg either way, but had the same time relations as those previously described. The persistence of the effects suggests that some alteration of the state of the vessels of the head was still possible. The intracisternal injection caused tremor and increased tone of facial and upper neck muscles, but no alteration in the tone of the muscles of the rest of the body. Intravenous injection of the salt in doses ten times greater than the intracisternal dose caused no change of carotid blood-pressure; this suggests that the effect is due to direct action on the medullary centres, and not to an increase in circulating blood potassium.

RESULTS OF INJECTION AFTER BLEEDING

Central blood-pressure was lowered by rapid arterial bleeding. Loss of 30–40 % of the blood volume (assuming blood volume of rabbit is 7 % of body-weight) reduced the pressure to 30–50 mm. Hg; the subsequent recovery was usually slow enough to give a base line. If recovery was too rapid, a second bleeding up to 10 % of the volume lowered the pressure again and was followed by a slow recovery.

The effects of intracisternal injection of potassium phosphate *before and after bleeding* were qualitatively the same. The sensitivity of the animals varied during the experiments and quantitative comparisons were not possible. The same dose of phosphate often caused a different blood-pressure response when repeated without bleeding. Our results did not indicate any regular alteration of the blood-pressure response after the bleeding; a rise of pressure was not maintained, the pressure falling again to the initial low level (fig. 2).

DOSAGE OF POTASSIUM PHOSPHATE

The range of volume of [illegible] these experiments was [illegible] amount was not always [illegible] often caused convulsions. In most cases 0·02 ml. caused blood-pressure and respiratory alterations without excessive limb movements. This volume of solution contained only 0 24 mg. of potassium.

ABSENCE OF PERMANENT TOXIC EFFECT

Rabbits were anæsthetised with ether, and sterile potassium phosphate solution was injected into the cisterna magna. The animals were then allowed to recover from the anæsthetic.

Injections of 0·05–0 075 ml. caused a temporary stimulation of respiration and some increase of tone of the limbs. The animals recovered normally from the anæsthesia and did not show any subsequent ill effects. A very large dose, 0 20 ml., caused a well-marked increase of respiratory rate and muscle tone; flexion-extension movements of the limbs began, but ceased on deepening the anæsthesia. On recovery from the anæsthetic the respiratory effect persisted for some time, and the animal showed a spastic paresis of the hind limbs; this latter condition cleared up rapidly, the animal behaving normally within an hour of the injection.

DISCUSSION

The reactions evoked by increasing the potassium content of the cerebrospinal fluid are due to excitation of nervous centres above spinal-cord level. Rapid injection of such a small dose of the phosphate into a vein has no visible effect, and the responses to the intracisternal injection are almost abolished by high section of the spinal cord with the vagi cut. Furthermore, Mullin, Hastings and Lees (1938) have shown that replacing the cerebrospinal fluid of dogs by fluid of high potassium or low calcium content increases muscle tone and may produce rise of blood-pressure, but irrigating the spinal cord or spinal roots with the fluid was ineffective. It is well known that injection of potassium salts into the circulation may alter the blood-pressure level and cause secretion by the adrenal medulla. The requisite dose, however, is larger than any used here. Intravenous injection of a dose ten times greater than the effective intracisternal dose was without effect.

The transient slowing of the heart and fall of blood-pressure following some of the injections would be most simply explained by direct stimulation of vagal centres by the salt. That this is not the true explanation is shown by the persistence of the responses after section of the vagus nerves, and it seems rather that there is a temporary depression of sympathetic centres. The increased tone of the muscles probably accentuates any rise of blood-pressure by a mechanical effect on the vessel, but it is clear that the pressure and tone changes are of independent origin. Small doses of phosphate always produced increase of muscle tone, but the blood-pressure might rise, fall or remain unchanged. Furthermore, Mullin, Hastings and Lees still obtained a rise of pressure after exhibition of curare in doses sufficient to paralyse voluntary muscles.

[illegible] equal doses of the [illegible] onses, even in the [illegible] ge of general condition. The number of failures to produce a rise of pressure may be related to the use of anæsthetics; [illegible] that the responses were [illegible] in anæsthetised dogs. [illegible] Dax (1942) had many failures in unanæsthetised men, and Stern herself indicates that the injections are not always effective. When a rise of blood-pressure occurs it does not last long. The duration may be curtailed under the experimental conditions, but it is noteworthy that Ainslie and Dax observed pressure changes in man more transient than those described above.

The short duration and erratic appearance of rise of blood-pressure after the intracisternal injection of potassium phosphate do not suggest that these injections would be of value in conditions of low blood-pressure following acute hæmorrhage. It is possible that a rise of central blood-pressure, however short-lived, might increase the blood flow through the vital centres at a critical time, but no such beneficial result was found by us. When the blood-pressure was low, potassium phosphate injections caused a temporary rise in some cases, but this was followed by a fall of pressure again to the low level. If however these injections should be tried as a form of therapy on shocked patients, the animal experiments show that there is not much danger of damage to the brain stem even from large doses.

SUMMARY

Potassium phosphate solution, prepared according to the directions of Stern, when injected into the cisterna magna of anæsthetised rabbits, caused a rise of blood-pressure, augmented respiration and increased muscle tone. The pressure change lasts only some 15 minutes and rarely exceeds 40 minutes. There is often a fall of pressure, with slowing of the pulse; both of these changes are independent of the vagus nerves. The responses are not altered by previous hæmorrhage. The pressure change is not wholly due to the alterations of muscle tone, but is due to some action of the salt at supraspinal levels. No permanent toxic effects follow the injection.

Note.—After this paper was written E. A. Smolik described the injection of 0·4–0·5 ml. of Stern's phosphate solution intracisternally in dogs anæsthetised with barbital (*Proc. Soc. exp. Biol. Med., N.Y.* 1943, **53**, 70). Dogs with normal blood-pressure showed increased respiration, after initial inhibition, and rise of arterial pressure. After prolonged hypotension following bleeding, Smolik found that the responses were not uniform but he does not describe the variations encountered; in this series of animals 3 died of respiratory failure after the injection. Four times the usual dose of phosphate caused rise of blood-pressure and stimulated respiration, but 6–10 min. later blood-pressure fell abruptly and the animals died.

We are grateful to Prof. B. A. McSwiney for his advice and assistance in performing the recovery experiments; and to Crookes Laboratories Ltd. for a supply of sterile potassium phosphate solution.

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"STRESS" FRACTURE OF FEMORAL NECK

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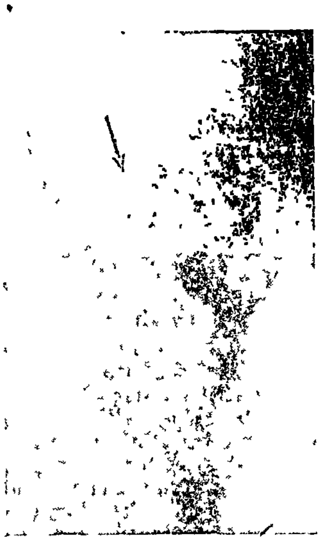
SURGEON EMS

A NUMBER of cases have lately been reported of fractures in young adults with no history of any specific trauma to account for them. These commonly occur in men undergoing military training, usually within the first 6 months of their service. They complain of pain in the region of the affected bone, inability to stand up to their training, and in some cases a painful swelling at the fracture site. Their practical importance lies in two points—that the radiological appearances may simulate those of Ewing's sarcoma, and that if not detected in time the fracture becomes complete and the treatment is then prolonged by many weeks. The following is a typical case.

An aircraftman, aged 21, came to surgical outpatients on March 15 complaining of pain in his right hip for 7 weeks. It began some 4 hours after he had been on a five-mile cross-country run. Though he had been on such runs before he had not worn heavy boots or been paced as on this occasion. He was not conscious of any sudden strain or injury during the run, but felt very exhausted afterwards. He had felt pain in the hip intermittently ever since, and was excused PT and running on this account. The pain began in the thigh muscles over the upper and outer aspect. Later he felt it over the great trochanter. There was also some stiffness in the knee. The pain had been bad enough to keep him awake some nights, but was improving at the time he was seen, though he had never been kept off his feet.

He was a slightly built but healthy looking man. There was no muscle wasting in the right thigh, and no difference in power on the two sides. Compared with the left, internal and external rotation of the right hip were limited by about 5°, abduction by 15° and extension by 10°. Pain was complained of over the great trochanter on reaching the extremes of flexion, rotation or abduction, and on hyperextension. There was no flexion deformity at the hip. There was very slight tenderness on compression of the two great trochanters.

X rays (see figure) revealed a fine fracture line across the neck of the femur, with some callus thrown out at the upper end, and some sclerosis in the centre. There was no displacement. He was treated simply by rest in bed with a transverse bar of wood nailed across the heel of his slipper to prevent outward rotational strain. This was maintained for 8 weeks; union proceeded uneventfully and in perfect position.



The arrow shows the site of the fracture

DISCUSSION

Similar cases of fractures in the neck of the femur without trauma or displacement have been reported by Samuel (1942) and Mansi (1943), and mentioned by Nordentoft (1940). In Mansi's case the patient was never confined to bed, but the fracture united without displacement. Fractures in the tibia, shaft of femur, fibula and other bones have been recorded, notably by Hartley (1942), who mentioned 14 cases. Changes in the structure of bone preceding fatigue fractures are described by Henschen (1941) as of two kinds—first, affecting the crystalline structure, and secondly, the physiological formation, whereby lamellar bone is replaced by more fibrous bone with a low calcium content; there are fibrous changes in the marrow, and may be subperiosteal thickening.

No abnormality of calcium metabolism has been described, and in the present case the blood-calcium level was 12·1 mg. per 100 c.cm. Though vitamin C is now known to be important in the formation and repair of bone no note of its level in such cases could be traced. In the case recorded it was only 0·27 mg. per 100 c.cm., which is below the minimum value (0·5 mg.) desirable in the blood, but above the figure (0·15 mg.) below which clinical scurvy occurs (Goodman and Gilman 1941). In view of the work of Ham and Elliot (1938) pointing out the deficiencies in strength and weight of bone in animals on a diet containing suboptimal amounts of vitamin C, this may be significant in the ætiology of these cases, though vitamin-C deficiency is common and these fractures rare.

I should like to thank Mr. J. Bastow, orthopædic consultant to the EMS for allowing me to retain the case; Dr. Phyllis Fraser for making prints from the radiograms; Lieut.-Colonel Hazard of the US Army for the ascorbic acid estimation; and Dr. J. H. Gubbin, medical superintendent, for permission to publish the case.

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NATIONAL SMOKE ABATEMENT SOCIETY.—The annual conference of the society will be held at 10 AM, on Friday, Nov. 5, at the Caxton Hall, Westminster, S.W.1, when measures for he prevention of smoke in relation to plans for postwar nstruction will be discussed

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UNTOWARD EFFECTS OF VITAMIN B_1

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THE purpose of this paper is to draw attention to a clinical condition occasionally observed after administration—mainly parenteral—of large doses of thiamine hydrochloride. Little has been reported about toxic effects of excessive administration of vitamin B_1; I have only been able to find the instances referred to below.

The considerable therapeutic effect of the vitamin B group appears to be due to their catalytic activity in intracellular oxidation (Leitner 1942). They are essential constituents of co-enzyme systems affecting intracellular respiration. Thus in the intracellular metabolism of glucose the pyruvic acid is broken down to acetaldehyde by the co-carboxylase which is the pyrophosphate of vitamin B_1. Metabolism in the brain and in the specific nervous tissue depends almost entirely on the oxidation of glucose. In vitamin-B_1 deficiency pyruvic acid accumulates in excess in these tissues and cannot be broken down to carbon dioxide and water. Furthermore lack of vitamin B_1 is nearly always part of a multiple deficiency (Goodhart and Sinclair 1940).

CASE-HISTORIES

I have recently observed the following two cases.

CASE 1.—A man aged 71, seen on March 2, 1943, had been in good general health up to the beginning of February and able to carry on a fatiguing and responsible job. About 4 or 5 weeks before he had become restless, irritable and tired; he experienced what he described as "thumping" throughout the body which led to disturbed sleep and increased exhaustion. In the last few days this "thumping" had appeared increasingly during day time as well, while restlessness, exhaustion and insomnia became worse in spite of drugs. Itching began, mostly on the extensor surfaces of the limbs; he became more and more depressed and tired. For some days he had been in bed with "asthmatic" attacks, each lasting for 2–4 hours with sneezing, palpitation, difficulty of breathing and extreme anxiety at the end of which he was completely exhausted.

Previously he had always been healthy and had never had any serious illness except herpes zoster in 1938 along the first division of the trigeminal nerve. During and after this attack, in which he experienced considerable pain, he was given a long course of injections of vitamin B_1, and his symptoms gradually improved.

He was a tall well-nourished patient, much agitated, apprehensive and depressed. Apart from some subjective and objective interference with sensation in the distribution of the ophthalmic division of the fifth nerve, and some lichenification, thickening and reddening of the extensor surfaces of both upper limbs no physical signs were found. Blood-pressure 175/85 mm. Hg; urine normal. Blood sedimentation-rate: 3 mm. in 1 hour. Blood-count: red cells 4,400,000; Hb. 12·6 g. per 100 c.cm.; white cells 7900 Polymorphs 33·5%, lymphocytes 26·5%, basophils 0·5%; monocytes 5%; eosinophils 34·5% (i.e. 2725 per c.mm.). Subsequent differential counts are shown in the table.

The high eosinophilia led to further inquiries and it was found that on casual advice injections of 25 mg. of vitamin B_1 had been administered repeatedly in the last 3 or 4 weeks by a nurse in his office, and that the beginning of these injections coincided with the onset of his illness. The first "asthmatic" attack began 7 hours after the fourth injection although some shortness of breath had already followed previous injections. A very serious attack occurred about an hour after the fifth injection. Dr. D. C. Norris, who witnessed this attack, described it as follows: "The patient had a normal temperature and pulse-rate but felt weak and shaky and unable to maintain a conversation. His extremities were cold and he complained of 'thumping' in the chest. The blood-pressure was 120/70 mm. Hg."

Skin tests with vitamin B_1 produced a weal of about 2 cm. diameter. The vitamin-B_1 injections were stopped and autohæmotherapy carried out; there were no more attacks afterwards. Repetition of skin tests after 4 weeks did not produce a weal; 3 mg. tablets of vitamin B_1 thrice daily for 2 subsequent days, and afterwards injection of 5 mg thiamine, did not produce any adverse effect. The patient was now quite well.

DIFFERENTIAL WHITE CELL COUNTS IN CASE 1

	March 2	March 4	March 15	March 26	April 5
	%	%	%	%	%
Neutrophil	33 5	37	56	62	60
Lymphocytes	26 5	26	24	21	30
Monocytes	5	5	4	8	7
Basophils	0 5	0 5	0 5		
Eosinophils	34 5	31	15 5	7	[illegible]
Eosinophils per c cm	2725	2480	1162	490	216

CASE 2 —A married woman aged 42 was seen in June, 1941 with polyneuritis As a child she had all the common fevers and later on had suffered from constipation and mucomembranous colitis for years All her illnesses were "very serious" and had unexpected "complications" For years she had experienced great difficulties in managing her life, and before the war she was having psychotherapy Owing to her self chosen diet and abuse of aperients she had a multiple vitamin deficiency going back for years She had been given, intermittently, large doses of vitamin B_1 by injection and other vitamins as well previously A change of diet and injections of 25 mg of vitamin B_1 were advised When seen 2 weeks later she was very excited, had tremor, insomnia in spite of large doses of sedatives day and night and complained of headaches palpitation and giddiness Although not familiar with the condition of vitamin B_1 overdosage at that time, I thought it advisable to discontinue the injections especially as the polyneuritis had improved The tremor, giddiness and palpitation had disappeared when the patient was seen a week later

DISCUSSION

These two cases and those published by other workers suggest that untoward effects of vitamin B_1 therapy may be either purely allergic, or similar to a thyrotoxic state

Ataxia after injection of vitamin B_1 in animals was first observed by Kreitmair and Moll (1935) Irritability, restlessness, transient dyspnœa, and with increased doses death, in animals, were described by Molitor et al (1936) and Hecht et al (1937), and interference with lactation and loss of nursing instinct with consequent starvation of the young by Perla (1937) *Toxic effects in man after large intravenous doses of* thiamine were first reported by Steinberg (1938) In 3 cases herpes zoster was produced after 4–8 weeks' treatment, which disappeared in each case after cessation of the injections, but returned when vitamin B_1 was given again In two of these cases nausea, fullness in the epigastrium, constriction of the [illegible] after [illegible]

[illegible] thiamine was given again daily and the same symptoms developed after 4½ weeks

Allergic symptoms were experienced in the following cases A wo[illegible] before (Laws [illegible] first daily, la[illegible] about 2 mont[illegible] reactions Suddenly—when the interval between injections was increased to 10 days—about 30 minutes after the injection violent sneezing, œdema of the lips and eyelids, and large urticarial weals covering the whole body appeared followed by dyspnœa, collapse, cyanosis and audible wheezing The symptoms were controlled by adrenaline Intracutaneous and passive transfer tests were both positive In another case (Schiff 1941) 57 injections of 25 mg of thiamine were given weekly without ill effect A few minutes after the 58th injection (6 injections had been already given from the same bottle, the last one 9 days previously) the patient developed nausea, vomiting profuse perspiration and collapse, the pulse disappeared respiration ceased and heart sounds became inaudible Mills (1941b) reported a case of sudden death after parenteral administration of vitamin B_1, at autopsy multiple ecchymoses beneath the pia mater over both cerebral hemispheres with areas of encephalomalacia and perivascular hæmorrhage were found Eisenstadt (1942) describes a woman of 31 who received 24 injections daily at hospital and afterwards had continuous treatment for 10 months without incident when suddenly, 5 minutes after an injection angioneurotic œdema of the tongue, lips and eyes appeared with flushing and unbearable itching Adrenaline controlled the symptoms in 15 20 minutes Skin tests were positive but transfer tests negative In another of his cases only local reactions appeared after 14 injections Stiles (1941) reported 2 cases who had taken thiamine orally and by injections intermittently for years without any ill effect After a considerable interval, thiamine injections ranging from 8–90 mg were again given twice weekly, and—in one case soon after the new series of injections, in the other case after 5–6 months' continuous treatment—nervousness flushing, tachycardia profuse perspiration and tinnitus appeared within about an hour Intradermal tests with thiamine were positive

In all reported allergic cases the hypersensitivity developed gradually In my case 1 the large doses of vitamin B_1 given 4 5 years before had caused no undesirable reaction fairly severe allergic reactions however, followed even after the first injection of the second course of treatment and the intensity and duration of attacks increased with subsequent injections After the 5th and last injection—though there was some degree of recovery after 5 6 hours—the anxiety state, shortness of breath, palpitation, insomnia tinnitus, headache and weakness persisted for 6 7 days

The immunological response in the published cases quoted was similar to protein sensitisation the incubation period needed to produce hypersensitivity always exceeding 7 days, with injections given at intervals of less than 7 days anaphylactic reactions were small or absent, and the most severe anaphylactic reactions followed intervals of 10 and 9 days In my case 1, injections followed each other at 2–5 day intervals which may explain why reactions were not more severe The hyperthyroid like irritability as indicated by the continued restlessness, insomnia and fatigue was another feature of the case The quoted cases seldom showed both types of manifestation, but possibly in the allergic cases the anaphylactic shock was so prominent that the observers omitted lesser clinical manifestations Skin tests in case 1 became negative after desensitisation which was complete after 5 weeks of abstinence from vitamin B_1 Symptoms resembling thyrotoxicosis (case 2) seem to suggest simple overdosage

Lack of vitamin B_1 is often only a part of a multiple deficiency, especially of the vitamin-B group In hot climates the vitamin B requirement is much higher than in cooler regions, but food grown there contains considerably less of the vitamin (Mills 1941b) Deficiency diseases of the vitamin B group are prevalent in hot climates (beri beri, pellagra, tropical nutritional anæmia), and in temperate climates usually arise in the summer months Thiamine is very soluble in water and easily absorbed, given as [illegible] ummer it might convert a [illegible] over saturation Case 2 [illegible] cases quoted all develope[illegible]

SUMMARY

Two cases are described in which long administration of vitamin B_1 produced severe symptoms Case 1 had had large doses of vitamin B_1 by injection some years before without any ill effects, but after a course of injections of 25 mg thiamine developed a condition like an anaphylactic shock, with eosinophilia of almost 35 %

Case 2 had symptoms resembling those of thyroid overdosage

Published cases are compared with these

I am indebted to Dr D C Norris for the description of the attacks in case 1

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PAROXYSMAL HYPERINSULINISM
DUE TO ISLET ADENOMA OF THE PANCREAS

MAURICE S.-M. RAYNER
M B CAMB
ASSISTANT PHYSICIAN

C. H. ROGERSON
M D LOND, M R C P
MEDICAL DIRECTOR

CASSEL HOSPITAL FOR FUNCTIONAL NERVOUS DISORDERS
(TEMP.) AT ASH HALL, NEAR STOKE-ON-TRENT

Note on the surgical aspect

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HYPOGLYCÆMIA due to endogenous hyperinsulinism is a comparatively rare condition, first described by Harris (1924). Since that time there have been a number of published groups of cases and reviews of the literature, among which the paper of Whipple and Franz (1935) may be mentioned in particular. The present case is described because the hypoglycæmic attacks presented features involving some fundamental problems in medical, psychiatric and surgical diagnosis.

CASE-RECORD

A married woman of 46 was referred to the Cassel Hospital in May, 1941, with a diagnosis of hysterical fits. She complained that she suffered from a series of attacks in some of which there was a disturbance of vision, in others shakiness, loss of the power of concentration, inability to speak and sometimes unconsciousness. Severe attacks involving loss of consciousness had become more common recently until they were at least of daily occurrence. Symptoms would last from a few minutes to an hour and a half. Between attacks she felt quite well. The first attack of unconsciousness had occurred 18 months before admission, though she had had minor symptoms for 6 months before that. She was on her way upstairs to bed after a Christmas party when she collapsed and was found by her maid lying on the floor. She could recollect no prodromal symptoms and could not explain what had happened. She continued to have such attacks at intervals and was thoroughly investigated for organic cerebral disease. Investigations were negative, and anticonvulsive drugs, given on the supposition that the condition might be epileptic, produced no improvement. It was then decided that the attacks must be psychogenic and she was treated by psychotherapy. Gradually the attacks became worse and associated with violent bodily movements and loud screams. Still with the idea that the illness was hysterical the patient was persuaded to enter a mental hospital. Treatment there produced no improvement and when convulsion therapy was proposed (the modern psychiatric panacea!) the patient discharged herself. Shortly afterwards, repeated physical examination having revealed no abnormality and the attacks resembling hysterical fits in general form, she was admitted to the Cassel Hospital.

The family history was normal. She had led a reasonably stable existence, first in business and then as a housewife. She had had a stillborn child 10 years before, after which there was occasional vomiting for a long time, apparently emotional in origin. She had had several attacks of abdominal pain in recent years which were presumed to be due to cholecystitis.

On admission she was having two major attacks every day, one during the early hours of the morning and one often about noon. The attack would begin with mental symptoms of which the patient appeared quite unaware; she would appear silly and irritable, with restless movements of body and limbs, and at times she would attempt to grasp the physician's hand. Next, *twitching of the muscles around the mouth* would be observed with alternate swallowing and protrusion of the tongue. By this time the speech would be slurred, but she would still respond to simple questions and would deny that there was anything the matter. Clonic convulsions would appear, principally of the left arm and leg, associated with violent and grotesque writhing movements of the body and loud inarticulate cries. This point might be reached in 15–20 minutes from the onset of the attack and was often the maximum development. Symptoms would then continue for about half an hour and die away leaving her exhausted but quite rational after about 1½ hours. There would subsequently be amnesia for the events of the attack.

During the first week no abnormal neurological signs were detected during the attacks or during the quite rational ...ing periods. She gave a good history of her life and responded well to deeper psychological probing. A number of minor maladjustments and disharmonies were revealed, such as might be found in many individuals, but no adequate psychogenic basis for the attacks was revealed. The grotesque bodily movements and loud cries with some of the other symptoms mentioned bore a close resemblance to phenomena often observed in hysterical fits, and this had been the opinion of a neurologist of great clinical experience who had seen her shortly before admission. On the other hand, it is a wise rule to insist that a diagnosis of psychogenic symptoms be made only on a basis of positive psychiatric findings, particularly in the case of major hysterical symptoms arising for the first time in a patient of mature age.

The problem fortunately began to resolve itself when it was found that the patient bruised herself severely on several occasions and was once incontinent of urine during the attack. These findings pointed strongly away from the diagnosis of an hysterical disorder and were confirmed by the presence of patellar and ankle clonus and extensor plantar responses on two occasions. It was then necessary to decide what other agency could be responsible for these extraordinary periodic disturbances of consciousness. A cerebral neoplasm seemed to be excluded by the previous investigations, nor did a further lumbar puncture show any abnormality. Idiopathic epilepsy does not give rise to an attack of such long duration. "Status epilepticus" consists of a series of attacks whereas this was clearly one continuous fit. The same objection applies to the possibility of the attack being in reality a brief epilepsy followed by a long post-epileptic condition. Careful observation showed that this was simply not so. Spontaneous hypoglycæmia was next considered and it was immediately found that the administration of large quantities of glucose by mouth at the beginning of the attack would invariably abort it. Blood-sugar estimation showed a level of 21 mg. per 100 c.cm. at the beginning of the attack; the diagnosis of spontaneous hypoglycæmia was thus established

This condition may arise from a number of causes. It may be due to a disorder of the islets of Langerhans or to the presence of excessively functioning islet-cell tissue outside the pancreas. It may also be due to hepatic, renal, suprarenal or pituitary disease. According to Conn (1940), who has made a careful survey of the field, most cases are due to hyperinsulinism (with or *without pancreatic adenoma*) or to liver disease. Convulsions are rare in hypoglycæmic states resulting from renal, suprarenal or pituitary disease. The lowest fasting blood-sugar readings are given by patients with hyperinsulinism, and a fasting blood-sugar below 50 mg. per 100 c.cm. (the previous diet being normal) is said to indicate hyperinsulinism with very few exceptions.

In this patient the early morning fasting blood-sugar varied from 29 to 40 mg. per 100 c.cm., at which levels her mental state was often surprisingly normal. Ingestion of 3 oz. of glucose produced a rise from 40 to 73 mg. in 15 minutes; the level then began to fall again and in the absence of further carbohydrate a fit supervened. Indeed, it became increasingly difficult to carry out blood-sugar examinations beginning from the fasting state, because the patient began to develop more and more severe fits. The figures which were obtained, however, confirmed the diagnosis.

A high carbohydrate diet was given with the addition of 12 oz. of glucose every 24 hours. This regime greatly reduced the number of hypoglycæmic convulsions and the patient was transferred to Windsor Hospital under the care of Mr. Gaymer Jones, who describes the results of surgical exploration of the pancreas below.

DISCUSSION

We would like especially to comment on the differential diagnosis of these fits. In their earlier and milder form they had borne a remarkable resemblance to hysterical attacks, so that the patient had received extensive psychotherapy. This was perhaps not merely a misdiagnosis but rather a more fundamental misunderstanding which is all too common at present owing to the cleavage between the mental and physical aspects of the individual still implicit in many of our ways of thinking.

The hysterical fit differs sharply in some respects from other types of fit, yet it has features in common with them. Hughlings Jackson, in his work on the symptoms following the dissolution of the functions of the central nervous system, described a negative and a positive element. The negative element consists of the loss of *function of the higher centres; the positive element* consists of the release of lower centres from higher control. These phenomena may be observed whenever there is a dissolution of the functions of the central nervous system whatever the cause may be. Hysteria may be regarded as one such cause, hypoglycæmia as another. In the hysterical fit there is abandonment of higher control, whether wilful or unconscious is a matter for discussion, and a release of lower centres bringing a stream of emotionally toned and often highly symbolic activity. It is this emotional and symbolic quality of the "release phenomena" which gives the hysterical fit its characteristic appearance. Other agencies, such as hypoglycæmia, which inhibit the higher centres may produce, *particularly in the early stages, very similar* release phenomena. Later of course, as in this case, the failure of higher centres will spread to involve the upper motor neurones and other areas not involved in the hysterical attack. It is therefore dangerous to deduce *from the appearance of the release phenomena in the* early stages the nature of the inhibiting agent. Where the released activity is obviously symbolic and highly emotional, a mental conflict may be inferred with some certainty; but even so the mental conflict may not be the cause of the release—it may appear on the surface only when the higher centres are deranged by some other agent. There are few people without some degree of mental conflict; therefore if the character of the release phenomena is to be accepted as a criterion for the diagnosis of hysteria, mistakes will continue to be made. Such mistakes are fairly common: they occur in many other conditions, among which cerebral tumours, disseminated sclerosis, arteriosclerosis and presenile dementia are well-known examples.

Whether in this case we should have arrived at the correct diagnosis had we not been fortunate enough to observe definite physical signs is questionable. It should, however, be possible for the psychiatrist to *whom such a case is referred,* in the absence of positive physical findings, to inform his medical colleagues that the psychological findings in the case are insufficient to account for the symptoms. This is made easier by the fact that in our experience gross hysterical reactions *have almost invariably a gross and not very deeply* hidden immediate cause, and are generally grafted on the background of a personality showing a tendency towards hysterical manifestations in the earlier life pattern.

One other point worth mentioning is the abrupt onset of many of the attacks. This feature is mentioned in few of the recorded cases, in most of which the onset is slower and the whole attack lasts longer. The dramatic suddenness of the attacks here served to direct attention away from the true ætiology. Experience with induced insulin coma in the treatment of schizophrenia has taught us what a wide variety of symptoms and modes of onset may be encountered. It may be worth while to employ the term "paroxysmal hyperinsulinism" in cases like this one to emphasise that the attack is acute and relatively brief. The explanation of the fairly rapid, spontaneous recovery from deep coma (which occurs so much less readily in induced hyperinsulinism), raises biochemical problems far beyond the scope of our observations.

Our thanks are due to the director and staff of the Stafford county pathological laboratory for biochemical investigations and advice.

Surgical Aspect

MR. GAYMER JONES

The patient was admitted to King Edward VII Hospital, Windsor, on Aug. 4, 1941. She had 3 fits *in the first 32 hours,* which lasted an average of three-quarters of an hour. It was found necessary to give her 1 lb. of glucose in 24 hours in addition to a liberal diet in order to keep her free from fits. Fits were very apt to occur during sleep; the most usual time being between 5 AM and 6 AM. The glucose was given in two-hourly doses of 1¼ oz. except that a double dose was given at midnight and at 4 AM and that she missed two glucose feeds during daytime when fits were less likely. A blood-sugar estimation on Aug. 12 gave the following results:

	Sugar (Folin-Wu)	True glucose
	mg. per 100 c.cm.	
During an attack (12.30 AM) ..	19 ..	5
After an attack (2 AM) ..	74 ..	67

A galactose-tolerance test disclosed nothing abnormal.

It was decided to operate and if a search failed to reveal an adenoma in the pancreas to remove as much of the pancreas as possible on the assumption that the increased insulin output might be due to a generalised hyperplasia of the islet tissue.

Operation on Aug. 14.—Weight 9 st. 2 lb. Anæsthetics: *avertin, gas-oxygen and ether, and local. A high long left* paramedian incision was made, and the pancreas approached through the gastrocolic omentum. The lesser sac was partially obliterated by adhesions, which ran along the course of the top of the pancreas. Careful palpation disclosed no tumour anywhere in the pancreas. It was decided therefore to remove as much as possible of the pancreas. This was done by starting at the tail, the peritoneum being divided along the superior and inferior borders. The pancreas was gradually lifted up from the splenic vessels by dividing and suturing the arteries and veins of supply. This part of the operation was tedious, because of the number of vessels which had to be dealt with, but not difficult; and when it had been completed the extreme tortuosity of the splenic artery was well displayed. The junction of the inferior mesenteric with the splenic vein was noted and the superior mesenteric vessels were demonstrated. There was a considerable length of pancreas between the inferior mesenteric vein and the superior mesenteric vessels. The dissection proceeded to the neck of the pancreas, which was astonishingly narrow and appeared to contain little pancreatic tissue. This change from body to neck was definite, and the tail and body were now attached only by a narrow pedicle which was beginning to widen at the point where section was made, just over the superior *mesenteric vessels. The stump was tied by two ligatures* penetrating the neck and then by one surrounding it; because there was so little tissue this was easy and it made the supervention of a pancreatic fistula very improbable. The portion of the pancreas removed weighed 36 g. and when measured *(after a year in formalin) was found to be 5½–6 inches long.* Two corrugated rubber drains were put down to the site of the operation and the abdomen was closed in the ordinary way. The wound drained a little serous fluid and, in order to prevent any possibility of erosion of the skin, the whole area was smeared *thickly with aluminium paste at the first* and subsequent dressings.

The incision healed completely in about a fortnight. Blood-sugar estimations were carried out on most days and showed a tendency to fall to 70–80 mg. per 100 c.cm. when glucose was discontinued. Near the end of the second week the patient again began to have fits. These were minor and infrequent to begin with, but gradually [illegible] it was necessary [illegible] from 2 PM until [illegible] t was clear that something further would have to be done but it was thought advisable to let her go home for a period in order that the immediate effects of the operation could subside. An examination of the excised portion of the pancreas did not disclose any adenomata and its histology was normal.

While the patient was at home it was found necessary to give her increasing amounts of glucose at 2-hourly intervals until she was taking 1½ lb. in the 24 hours. During the night her husband had to arrange for this by setting an alarm-clock to go off every 2 hours. Such amounts of glucose were difficult to obtain in war-time. She was readmitted on Jan. 12, 1942. Her weight had gone up considerably and even after 17 days of treatment was 11 st. 4¼ lb. on the day of the second operat[illegible] —an increase of 2 st. 2¼ lb. in the interval since the fi[illegible] operation. Her appearance also had [illegible] ably. She was now curiously blown [illegible] and neck and there was an eno[illegible] around her body. The act of spe[illegible] of breath.

A blood-sugar curve carried out on Jan. 14 gave the following readings :

		Blood-sugar mg. per 100 c cm.
Fasting		62
After glucose 50 g. :	½ hr.	141
	1 hr.	113
	1½ hrs.	42
	2 hrs.	27

There was no sugar or acetone in the urine throughout the test. During the 12 hours preceding the test the patient had only taken glucose : it was necessary to allow this in order to prevent fits. The amount taken was 1½ lb. in 30 oz. of water. An endeavour was made to reduce her weight by cutting down the glucose to ¾ lb. in 24 hours and giving a much lighter diet. On this treatment she remained almost, but not quite, free from fits.

The second operation was performed on Jan. 29, it having been decided now to remove as much as possible of the head of the pancreas if an adenoma should again not be found. Anæsthetics : avertin, gas-oxygen and ether, and local. No intravenous glucose was given. The abdomen was opened by a right paramedian incision. The head of the pancreas was first palpated in situ and since no adenoma could be felt the duodenum and head of the pancreas were mobilised by dividing the peritoneum all round the right side of the curve of the duodenum ; this allowed these structures to be brought well up into the wound although the patient was fat. They were taut in this position and could be examined with a finger in front and a thumb behind. A localised tumour was then palpated in the middle of the head of the pancreas, towards its anterior aspect. This area showed as dull pink in the yellowish-white of the surrounding pancreas, in the manner described by Whipple (1936). A small incision was made on the anterior surface and with a little blunt dissection an adenoma was shelled out without difficulty. There was one bleeding point which clearly represented its vascular supply. This was ligatured and the pancreas and duodenum allowed to fall back into position. The liver looked as if some fatty infiltration was present ; the gall-bladder was found to contain a few stones but it was thought better not to perform a cholecystectomy after the lower end of the common bile-duct had been manipulated. The stones were therefore removed and the gall-bladder drained. The appendix showed no evidence of disease and was not removed. A drain was placed down to the head of the pancreas and the abdomen was closed.

The patient was little disturbed by the operation and was discharged with the wound well healed 21 days later. A glucose-tolerance curve done the day before she left showed :

		Blood-sugar mg. per 100 c cm.
Fasting		128
After glucose 50 g. :	½ hr.	171
	1 hr.	221
	1½ hrs.	210
	2 hrs.	210

The urine when she was fasting and 2 hours after glucose contained no sugar. The pathologist remarked : " This seems to indicate a mild diabetic phase with a raised renal threshold."

The adenoma consisted of three small round tumours grouped into one mass, and weighed 1·31 g. Burtness and his colleagues (1941), in describing a similar case, estimate the approximate amount of islet-cell tissue in an average pancreas as 2·25 g. ; therefore the adenoma removed in this case represented an increase in the insulin-secreting tissue of nearly 62·7 %. The pathological report upon the tumour states : " The tumour measuring approximately 2 cm. by 1·2 cm. is well encapsulated. Microscopically it shows areas of compact cuboidal cells associated with others in which similar cells form vesicles of varying sizes. In an occasional vesicle the epithelium projects inwards as a papilla. There is a scanty stroma of connective tissue. The picture is similar to that seen in the thyroid in thyrotoxicosis." Analysis of one of the gall-stones showed it to be composed of cholesterol and bile pigment.

The diastatic index on Feb. 18 was 25 units, estimated on a 24-hour sample of urine. Removal of a large amount of pancreas therefore had not produced any effect. Analysis of the fats in dried fæces on March 23 gave : neutral fats 8 %, fatty acids 5·1 %, soaps 8·9 % (22 % in all). The total fat therefore was within normal limits although the proportion of unsplit fat was a little high.

Since leaving hospital the patient has kept well and had no fits. On Aug. 27, 1942, her weight was 9 st. 4 lb. and she " had never felt better." A galactose-tolerance test disclosed no abnormality of liver function. Microscopical examination of the fæces showed no excess of undigested food and no evidence of defective fat splitting. Further glucose-tolerance tests on that date (A) and on July 14, 1943 (B), gave the following readings :

		Blood-sugar mg. per 100 c cm (A)	Blood-sugar mg. per 100 c cm (B)
Fasting		161	80
After glucose 50 g. :	½ hr.	256	136
	1 hr.	266	136
	1½ hrs.	221	107
	2 hrs.	182	75

No acetone or sugar in the urine.

DISCUSSION

This case illustrates the fact that before excluding the presence of an islet adenoma the duodenum with the head of the pancreas should be mobilised in order that proper examination of the head can be carried out. It is interesting that Whipple and Bauman (1941) report 3 cases in which, since no tumour was found at the first operation, three-quarters of the pancreas was resected—without result. In each case a second operation was performed and when the duodenum was mobilised an adenoma in the head of the pancreas was found and removed. Rudd and Walton (1941) describe a case in which the adenoma was situated in the gastrosplenic omentum about 1 in. beyond the lower part of the tail of the pancreas. It is clear therefore that the search should also extend *beyond* the pancreas. An adequate search requires wide exposure of the pancreas and it is probable that a transverse incision offers the best approach. Whipple (1935, 1936) describes this incision dividing both recti, and Walton used it in his case.

There seems to be no need or even justification for removal of the spleen when resecting the tail and body of the pancreas for non-malignant conditions. Removal of the spleen would certainly not have made the first operation described above any easier and if the contention of those who adopt this procedure is that it overcomes the difficulty of separating the pancreas from the splenic vessels, they are giving this difficulty too much emphasis. Removal of the spleen may even lead to trouble if the splenic vessels are lifted up and removed with the pancreas, because the inferior mesenteric vein may be encroached upon and damaged. The removal only of that part of the pancreas to the left of this vein would be quite insufficient to cut down the insulin supply.

The evidence of fatty infiltration of the liver fits in with the experimental findings discussed by Orr (1941) ; he quotes experiments performed by Dragstedt and by Boyce. It seems that this fatty infiltration is due to the actual removal of part or the whole of the pancreas and not to the absence from the intestine of its external secretion. It does not develop for instance if the ducts are severed or ligatured and the pancreas is left in situ. In the present case the galactose-tolerance curve did not show any loss of liver function associated with the infiltration.

The slight tendency for the glucose-tolerance curve to be of the diabetic type following the removal of the adenoma conforms with the findings of Whipple and Bauman, who also showed that after a period which may be as long as 2 years glucose utilisation assumes the normal rate. They point out that this return to normal occurred even in their 3 cases in which three-quarters of the pancreas had been removed, demonstrating that the human pancreas, like the kidneys and liver, has an enormous functional reserve. In my case the diabetic type of curve still persists 7 months after the second operation. Though about 75 % of the pancreas must have been removed at the first operation the continuation of the fits showed that this did not balance the presence of a tumour which only contained ml in quantity to 62 7% of ge pancreas This suggests function of the cells in an adenoma is greater than that of normal cells Owing to war conditions it was impossible to investigate the insulin producing properties of the cells of the adenoma

Loss of that part of the pancreas distal to the head, though equal to about three quarters of the total pancreatic substance, did not interfere with the digestion of fat starch or protein

Summary

A case of hypoglycæmic convulsions due to a tumour of the islet cells of Langerhans in the pancreas had been under observation for nearly two years before admission to the Cassel Hospital and a diagnosis of hysteria had been reached

The term paroxysmal hyperinsulinism " is suggested to describe cases of this type with a sudden dramatic onset of the hypoglycæmic fit

At a first operation the tail and body of the pancreas were removed without improvement of symptoms , at a second operation an adenoma was found in the head of the pancreas only after the duodenum and the head had been mobilised The adenoma was shelled out and the patient recovered

Mobilisation of the duodenum and head of the pancreas is necessary in every case where an ordinary search for such an adenoma has failed

I should like to thank Sir Arthur Hurst and Dr George Graham for their helpful advice, Dr N F Maclagan and Dr E Sayle for their help with the pathological investigations, and Mr N A Miller for kindly assisting me at the operations

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PROSTATIC ENLARGEMENT

TREATED BY THE BRAASCH-BUMPUS PUNCH

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TREATMENT of prostatic enlargement by the perurethral route the past 10 years, ion about the sco able method, and red with suprapubic enucleation

In one general surgical unit at the Victoria Infirmary, during the past 8½ years, the circular knife method of resection has been used in over 100 patients with bladder neck obstruction Our decision to try the perurethral method of prostatic resection in 1934 implied some dissatisfaction with results over the previous 10 years These are summarised in table I The mortality figures for suprapubic enucleation, usually a two stage procedure, are high It is true that during the earlier years at least the value of indwelling catheter drainage, and the technical refinements of the Thomson Walker one stage operation had not been thoroughly appreciated The salient fact remained however, that there was a large group of patients for whom suprapubic enucleation of the prostate was too formidable a procedure We turned to perurethral resection as a possible solution of the problem of the poor risk patient, and an attempt to eliminate as far as possible the misery of permanent suprapubic drainage

TABLE I—MORTALITY IN 111 CASES OF PROSTATIC OBSTRUCTION (1924–33)

—	Cases	Deaths	Mortality (%)
Suprapubic enucleation	64	12	18 7
Suprapubic cystostomy	25	14	56 0
Catheterisation only	22	7	31 8

CHOICE OF METHOD

Most surgeons in this country have preferred the McCarthy instrument for endoscopic resection Here the cutting is done by a wire loop carrying a high-frequency current High frequency cutting currents have the disadvantage, however, that unless accurately controlled, they may heat the tissues in the vicinity of the actual site of burning beyond their thermal death point This leads to sloughing and sepsis

On theoretical grounds, the circular knife method of resection, in which only a coagulating current is used for hæmostasis seemed safer We were further influenced in our choice of method by the fact that one of us (R M), while on the staff of the Mayo Clinic nearly 20 years ago, saw Bumpus getting excellent results by this method in minor types of prostatic obstruction

The Braasch Bumpus resectoscope is a direct vision instrument with a fenestrum near the beak in which the prostatic tissue is engaged and then excised by a circular knife Hæmostasis is secured either by a multiple needle electrode before cutting or by coagulation of bleeding points later by a single point electrode This instrument has since been freely modified by Gershom Thompson[1] to permit of more rapid resection We have used a Thompson resectoscope of smaller calibre (24 F) in a few of our later cases where the larger Braasch Bumpus instrument (30 F) could not be introduced

Though Young of Baltimore must be given the credit for the introduction of the punch " method of prostatic resection, it is at the Mayo Clinic that the method has been extensively developed Up to 1930, only the lesser degrees of bladder neck obstruction were dealt with perurethrally , these comprised the small fibrous prostate, the median bar obstructions, and the smaller adenomatous enlargements, chiefly of the so called middle lobe Collectively they represented only 15% of the total number of patients treated for prostatic obstruction From 1930 onwards, the method was extended to deal with almost every type of adenomatous enlargement, so that by 1933, 98% of the patients were dealt with perurethrally Coincident with this, the amount of tissue removed at one or more sittings was increased up to 40 g or more in the case of the large prostates The aim during this period was not only to produce good immediate results even with the largest prostates, but to achieve a permanency of relief which would be comparable to that obtained by the open operation More recently stress has been laid on the shortening of the period of hospitalisation Many patient means is cut the sta rather less importance than formerly is attached to urinary sepsis and high blood urea values At the Mayo Clinic also in cases with much renal damage it is considered safer to drain by the urethra for a short period than to perform a cystostomy and drain for a much longer period in order to obtain better renal function values

TECHNIQUE

Preoperative care—At the Victoria Infirmary, we considered careful preparation just as important in perurethral resection as in suprapubic enucleation Patients admitted with retention—and the vast majority were in this category—were drained with the Foley self retaining catheter In the average case, the patient was ready for operation in 10 days In a large number, however, longer periods of preparation were necessary before urinary output was sufficiently increased, and blood urea and urea clearance values stabilised In the worst cases, where drainage beyond two weeks was necessary, or the indwelling catheter was badly tolerated we did not hesitate to do suprapubic puncture, W occasionally to send the patient home for a m two, provided home conditions were satisf

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[1] Thompson G J *Proc Mayo Clin* 1940

[2] Wardill W L M *Lancet* 1941 ii

Gershom Thompson, in his plea for the short hospitalisation of these patients, has compared the elderly prostatic sufferer to a foundered horse, in that once he is down, it is difficult for him to get up. We agree it is advisable to get the patient out of bed within a few days after operation, but we are still convinced that in the case of the average patient with whom we have to deal in general hospital practice, a preoperative period of 1–3 or even 4 weeks is always beneficial, and brings many an apparently hopeless case within the range of successful surgical treatment. Like Thompson we have come to attach less importance than formerly to actual blood-urea and urea-clearance figures, provided they were stabilised; and in several instances we have operated successfully on patients admitted to hospital with blood-urea values of 200 mg. and above, but stabilising after adequate preparation to between 100 mg. and 120 mg.

Selection of patients.—The guiding principle was the reduction of mortality in the poor-risk patient, who was found for the most part, though by no means exclusively, in the 65–80 age-group. We started on the assumption that if, by perurethral resection, relief could be obtained for a period of 5–10 years, this would cover the average life expectancy of this advanced-age group. On the other hand, in the younger 50–65 group, with a life expectancy up to 20 years or more, we felt justified in dealing with the fibrous prostates, bar obstructions, and smaller adenomatous enlargements perurethrally, but we continued for the most part to enucleate the largest prostates suprapubically, unless this was rendered inadvisable by the poor physical condition of the patient. It was felt that in the case of the largest prostates, with limited experience, and within the arbitrary operating time-limits which we imposed upon ourselves, we could not hope to remove the large amounts of prostatic tissue which would make the final result comparable with that obtained by open operation. To redress the balance by lengthening the operating time, or by having recourse to two or more sittings, appeared to detract from the essential safety of the procedure, and to present no decided advantage over one-stage suprapubic enucleation. Occasionally the choice of open operation was conditioned by inability to introduce the punch, while in 2 cases, enucleation followed failure to relieve obstruction perurethrally.

Operation.—For anæsthesia, light open ether with plenty of oxygen was preferred. In earlier cases low spinal anæsthesia was used; this certainly facilitated the introduction of the resectoscope, and permitted working in a relatively bloodless operation field. This advantage was, however, offset by the increased reactionary bleeding after the patient returned to the ward. With ether, on the other hand, the pressure is maintained, bleeding points are readily seen and controlled, and the danger of massive postoperative hæmorrhage is reduced to a minimum.

The large Braasch-Bumpus punch (30 F) is often difficult to introduce, and usually the external meatus must be dilated with straight bougies. Using the punch as a direct cystoscope, the bladder neck is first examined to determine the disposition of the obstructing masses. The operation is begun by removing some prostatic tissue from the posterior rim of the bladder neck. This facilitates manipulation of the instrument within the bladder, and the lateral intravesical projections are then removed methodically, starting from within the bladder and working towards the prostatic urethra. The tissue is first coagulated with the 5 prong electrode. We tended at first to over-coagulate, at times getting necrosis, sepsis, and slight secondary hæmorrhage as a result. Preliminary coagulation was therefore cut down to a minimum and most reliance was placed on the single-point electrode at the end of the operation.

The excised portions of prostate are flushed out of the bladder or removed by special forceps. The use of 1% citrate solution as the irrigating lotion reduces clotting and keeps the field of vision clear. The insertion of a Foley self-retaining catheter completes the operation. The operating time has been kept down to 30 minutes, which includes the time of induction of the anæsthetic. After a little practice, we were able to remove about 10 g. or more of tissue in this time. If the lateral lobes were fairly large, and the removal of more tissue was advisable, this was deferred to a second operation 10 days to 2 weeks later. A second operation was done in only 5 patients. In the minor degrees of obstruction, the removal of 3–5 g. of tissue was usually sufficient.

In the after-treatment, the bladder is irrigated every half hour during the first 24, and every hour during the second 24. The urine is often clear after 24 hours, and almost invariably after 48. The catheter is removed on the fourth to sixth day and the patient allowed up. In an uncomplicated case, he is allowed home on the seventh to the tenth day.

Complications.—The postoperative course is usually uneventful and quite afebrile. Complications are due in the main to technical faults. Sepsis is the most serious, and is due mainly to overcoagulation. It shows itself by a swinging temperature between the seventh and twenty-first days, and there may be associated hæmorrhage, though in only one case in our series has this been profuse. The single case of primary clot retention was due to a mistake in using lotion much too hot for irrigation so that the bladder was burnt. This unfortunate patient also furnished our single instance of partial incontinence, which persisted for several months and then improved. Patients often complain of slight lack of control for a few days after the removal of the catheter, but with the exception of the case mentioned above, this has never lasted beyond 10 days. The single case of rectal fistula, due probably to overcoagulation, emphasises the need for extreme care in operating in the middle line posteriorly. Penile stricture is mainly due to trauma associated with the large size of the instrument. It occurs in the anterior urethra, usually just behind the meatus, though in one of our cases there was a more extensive fibrosis involving most of the length of the urethra.

Technical experience is the main factor in avoiding complications. This is borne out by the fact that with one or two exceptions, all complications occurred in the first series of 50 cases. In the whole series of 101 cases complications were as follows: clot retention, 1; sepsis, 5; epididymitis, 4; secondary hæmorrhage, 3; stricture, 2; incontinence, 1; rectal fistula, 1.

RESULTS

In the series of 101 patients submitted to perurethral resection, there were 10 cases of malignant prostate. In 13 patients suprapubic cystostomy was carried out as a preliminary measure, because it was impossible to pass a rubber catheter, the indwelling catheter was not tolerated, or drainage had to be prolonged beyond the usual 10-day period. In another 7 patients, permanent suprapubic drainage had been instituted at periods varying from 3 months up to 5 years before admission.

The eldest patient in the series was 87 and the average age just over 69. There were 7 deaths in the series, of which 5 occurred in the first 50 cases and only 2 in the second 50. This improvement in mortality figures was due partly to increasing technical experience, and partly to a realisation that the method had its limitations and that not every patient could be made safe for it. The results were classed as good in 68, fair in 15, and unsatisfactory in 11. The last group included patients who had to have subsequent enucleation because of failure to relieve obstruction by the punch; patients in whom frequenc and bladder discomfort remained prominent; and case of non-malignant enlargement with recurrence o symptoms within 2 years after operation. We have ha a very few recurrences after 3 and 4 years, but in mos cases relief has been obtained for periods of 5 years an more.

In the relatively younger and fitter patients with large prostate, suprapubic enucleation is still in ou opinion the operation of choice, but the perurethra procedure is a great advance in the treatment of th older and frailer patients. In general hospital practic this latter group is in the great majority, and the choic otherwise would lie between permanent suprapubi drainage and a hazardous removal by open operation.

The drop in mortality attributable to the introductio of the punch operation becomes especially significan when taken in conjunction with the rise in the oper-ability-rate over the same period. During the period 1921–33 (table I) only half the patients admitted with [illegible] considered fit for suprapubic [illegible] death-rate shows, this was [illegible]

[illegible] total series of 192 cases [illegible] is set out in table II; it

TABLE II—MORTALITY IN 192 CASES OF PROSTATIC OBSTRUCTION (1931–41)

	Cases	Deaths	Mortality (%)
Suprapubic prostatectomy	35	1	2·9
Perurethral punch ..	101	7	6·9
Suprapubic cystostomy ..	25	10	40·0
Catheterisation only ..	31	21	67·7

shows that from two-thirds to three-quarters of the total number of patients admitted with prostatic obstruction have a good chance of permanent relief from their symptoms, and many of them are saved from the gloomy prospect of permanent suprapubic drainage. Of administrative interest is the fact that the average stay of these patients in hospital has been cut by more than half.

There remains a hard core of prostatic sufferers, amounting to about a quarter of the total admissions, who are beyond surgical aid. Many die within 48 hours of admission. Perhaps in the future the knowledge that relief can be obtained by a relatively minor procedure will encourage such patients to come earlier for treatment.

The method is most useful in cases of fibrous prostate, [illegible] the pallia- [illegible] as general [illegible] we cannot claim to have explored all the possibilities of the operation. The final evaluation must rest in the hands of those younger urological surgeons in this country who with abundant opportunity for technical improvement are following the Mayo Clinic lead and practising the method exclusively.

SUMMARY

During the past 8½ years, 101 patients with prostatic obstruction have been treated by the Braasch-Bumpus punch.

The operation is safer than suprapubic enucleation, and therefore more suitable for the older and frailer patients who bulk so largely in general hospital practice.

The method is most useful in dealing with the fibrous prostate, the me[illegible] rgement, and in the palliative [illegible] prostate, but with the requisi[illegible] almost any degree of prostatic enlargement can be successfully dealt with.

HIPPURIC-ACID EXCRETION AND URINE VOLUME

ALLAN PALMER, M D OREGON
MAJOR, USMC, CHIEF OF LABORATORY SERVICE, 30TH AMERICAN GENERAL HOSPITAL

A SIGNIFICANT positive correlation is said to exist between the amount of hippuric acid eliminated by the kidneys and the volume of urine secreted during the same period. This conclusion is based on an analysis of a series of hippuric-acid synthesis tests on 100 patients with suspected liver disease who were given an intravenous injection of an excess of sodium benzoate. Higher than normal values for hippuric-acid excretion were associated with large volumes of urine. Low values in some patients with hepatic disease could be increased to normal or above by inducing water diuresis.

In tests which I have carried out on 153 unselected menopausal women a wide range of values for hippuric-acid excretion was observed. The tests were done by tl[illegible] s[illegible] st[illegible]

first hour was 1·25 ± 0·26 g. with an extreme range of 0·41 to 1·86 g. The calculated mean and standard deviation for the volume of urine excreted during the same period was 133 ± 71 c.cm. with an extreme range of 32 to 360 c.cm.

In order to determine whether or not a real correlation exists between grammes of hippuric acid and volume of urine excreted in normal persons a correlation coefficient was calculated from the data obtained from this control series. The coefficient r was 0·27 ± 0·08 ($t = 3{\cdot}53$, P = less than 0·01). This represents a significant positive correlation and confirms the findings of Machella et al.[2]

The control data were further analysed by arranging the tests numerically with respect to the volume of urine excreted in each test and determining the average grammes of hippuric acid excreted in each consecutive group of 25 tests. These values are shown in the last column of the table. It will be observed that the average value increases at first as the volume of urine increases, but that, from the 3rd group on, values remained relatively constant.

Test numbers	Range of urine volumes (c.cm.)	Av. value hippuric acid excreted (g.)
1– 25 ..	32– 65 ..	1·01
26– 50 ..	67– 90 ..	1·23
51– 75 ..	90–113 ..	1·32
76–100 ..	114–146 ..	1·33
101–125 ..	148–188 ..	1·28
126–150 ..	190–325 ..	1·30

Four separate correlation coefficients were calculated respectively for the first 75 tests, the first 100 tests, the last 75 tests and the last 50 tests. That found to have the greatest statistical significance was the correlation coefficient for the first 100 tests—its value being 0·43 ± 0·08 ($t = 5{\cdot}27$). This seems to indicate that the weight of the positive correlation in the entire series was borne by the group of tests where the volume of urine was less than 150 c.cm. There was no significant correlation in the groups comprising the last 50 or last 75 tests.

It is concluded that abnormally low values obtained for hippuric-acid excretion for the first hour may be inaccurate if the volume of urine secreted during the *same period of time falls below 150 c.cm. In order to* avoid this error in the use of the test enough water should be administered when the test is started to ensure a urinary output of at least 150 c.cm. This can usually be accomplished by giving 200 c.cm. of water by mouth at the time of the intravenous injection.

New Inventions

AN AUDIBLE WARNING OF EMPTY GAS CYLINDERS

IN straight circuits failure of the oxygen supply is inaudible and is often not noticed till cyanosis appears. The pressure gauge on the oxygen cylinder encourages

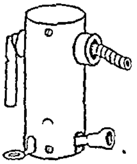

Fig. 1

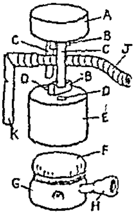

Fig. 2

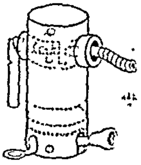

Fig. 3

[illegible] is completely [illegible] omit to watch [illegible] orber circuits [illegible] cyclopropane is audible, and the failure of any one of these gases, particularly oxygen, can be a great nuisance.

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[2] Machella, T. E., Helm, J. D. and Charnock, F. W. *J. clin. Invest.* 1942, 21, 763.

The apparatus here described (fig. 1) gives audible warning of failure of gas pressure; it was made by a local plumber out of scrap material. The illustrations are half scale.

The "saucepan" G (fig. 2) is surmounted by a thin rubber diaphragm F which rises when it is fed with gas from the reduction valve at the normal 5 lb. to the square inch or so, and is of course in parallel with the rotameter or other instrument. The diaphragm balloons, as in the ghost fig. 3, and raises the plunger E. As a result the tube J feeding the whistle is nipped between the *very* blunt knife edges B and B, as shown in fig. 3. The whistle K, which is supplied with air under pressure from an ordinary Junker bulb (not shown), *is then unable to sound. When the gas pressure to the* apparatus fails (empty cylinder, kinked or pinched tube, or otherwise) the plunger E falls and the whistle sounds. The rods C and C work in their holes D to compel the rising knife edge on the plunger B to keep vertically in line with its mate on the fixed upper member A.

I have two of these gadgets bolted side by side to my rotameter plus carbon-dioxide absorber circuit; the two are fed by a single Junker bulb. I have had them in use for over a year with satisfaction.

W. H. MARSHALL, MB CAMB.

Reviews of Books

Studien am menschlichen Sperma

CHARLES A. JOEL. (Schwabe. Pp. 154. Sw. fr.20.)

THIS book is intended as a comprehensive account of the human spermatozoon, the discovery of which Dr. Joel rightly attributes to the elusive Johann Ham, and not, like so many authors, to Leeuwenhoek. The author follows carefully the early history of our knowledge of spermatozoa and his arrangement of the material and full references will be valuable to later historians of the subject. On modern matters the standard of the book varies. It includes a useful account of Dr. Joël's own study of 1330 ejaculates, with technical details of collection, preparation and microscopical study, and with figures of the various kinds of abnormal spermatozoa and other bodies sometimes occurring in semen. He considers that human spermatozoa live up to 48 hours in the woman's body. The account of the enzymes of semen is useful. The part of the book concerned with chemical action on spermatozoa is the weakest. The old work of Kölliker, Günther and Gellhorn is described, but the large modern studies of the subject under the Birth Control Investigation Committee and other bodies are scarcely mentioned. The study of chemical contraception has been mainly British and American, and the outlook of this book is essentially mid-European. The works of Baker, Dickinson and Voge are not mentioned, and among a total of 538 references only four are to the *Journal of Contraception.*

Diseases of the Breast

Diagnosis, Pathology, Treatment. CHARLES F. GESCHICKTER, MA, MD, with a section on treatment in collaboration with MURRAY M. COPELAND, AB, MD, FACS. (Lippincott. Pp. 829. 72*s.*)

CONCEPTIONS of the pathology of the mammary gland have undergone profound changes during the past twenty years, which have had their effect on diagnosis and treatment. There is thus room for this book, which gives a full account of breast pathology from the modern standpoint. The endocrinology of the mammary gland is reviewed, including the results of animal experiments and the interpretation of histological studies. Evidence on which endocrine treatment of the different forms of "chronic mastitis" are based is clearly set forth, with details and results of treatment. The end of it all, after 280 pages, is the statement that "the best form of endocrine therapy in all forms of chronic cystic mastitis is normal pregnancy and lactation, and this should be recommended to the patient whenever feasible." This counsel of sanity is not new: it was expressed twenty years ago by Keynes (*Brit. J. Surg.* 1923, **11**, 89). Artificial endocrine therapy has a limited place, and may even have dangers. The statistical basis for estimating the relation of chronic mastitis to cancer is notoriously difficult to free from error, yet there does seem to be some evidence that innocent epithelial hyperplasia in the mammary gland indicates a predisposition to cancer. The value of irradiation in combination with surgery in the treatment of mammary cancer is underestimated, it seems, in the USA. This may be because of different standards in dosage; in the Baltimore clinics the dosage given is much lower than that customary in this country. Advocates of radical surgery do not always face squarely the problems which they themselves create; thus even in this otherwise comprehensive book lymphatic œdema of the arm, a common sequel of radical surgery, is completely ignored. A reference is made to œdema caused by axillary metastases, but the only form of treatment offered is one that has long since been discredited. Taken as a whole, this is the important contribution to the subject of breast pathology and surgery which might be expected from the school of Halsted and Bloodgood.

The Foot

(3rd ed.) NORMAN C. LAKE, MD, MS, D SC LOND., FRCS. (Baillière. Pp. 432. 15*s.*)

IN the third edition of this useful book much new matter has been added on such clinical conditions as trench foot, march fracture, immersion foot and foot fatigue in industry and the Services. The addition of figs. 13–17 is somewhat unfortunate. When fig. 15 was published originally Pocock (*Brit. med. J.* 1942, i, 454) suggested that the drawings of the feet labelled "macaque" and "gibbon" were so unlike the feet of these animals that they had possibly been labelled in error. The footnote, on p. 33 of the book, does not meet his well-founded objections to the representation of the foot of the "mountain" gorilla (unfortunately depicted again in fig. 76). The point at issue is not whether this gorilla is a separate species, but that the figure of its foot as given by Akeley is not a just representation of the foot of any gorilla. It is also a pity that fig. 8 (present in previous editions), designed to sl
relative proportions of the tarsal and pretarsal
in embryo and adult, does not accurately main
proportions of the original figure of Schultz from
is taken. Criticism of these details cannot detr
the merits of the book as a whole. The sections t
illustrate are more or less ornamental introduc
the main subject and it is upon the first-hand
tions of clinical conditions (rather than the contr
of clinicians to the subject of the morphology of t
that the book is to be judged. Estimated by
clearly meets a definite need, and meets it well

War-time Food for Mother and Child

GEOFFREY H. BOURNE, D SC. (Oxford Univ. Press. 2*s.* 6*d.*)

THIS small book contains an astonishing am
information, much of it not easily found els
about the nutritional needs of pregnant and
mothers, of embryos and of children, and ab
means of satisfying them. It is largely concern
the accessory food-factors, mineral and organi
sources, preservation, administration and dosag
the balance of the diet, and the optimum quant
the staple war-time foods. Dr. Bourne states h
exactly and with restraint, though he seems to
claims of the accessory food factors as chief deter
of health rather high and to hope greater thin
dietetic reform than clinical experience appears to
It is not quite clear for whom the book is intende
language is non-technical, though it sometimes
into laboratory jargon, and it contains detailed
and practical hints in plenty; but the practic
gestions are interspersed and hedged about with
and decimal points which may discourage busy n
in search of simple directions, and will not
enlighten the erudite. Perhaps it will be most us
a thought provoker to those who have to feed n
and babies or to advise them about their diet ar
have become set in their ways. Here are fac
propositions to unsettle them and make them th

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Bull. Johns Hopk. Hosp., 51, 5[illegible]
"An evaluation of progesterone [illegible] *the treatment of Endometrial H*[illegible]

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ORGANON LABORATORIES
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THE LANCET

LONDON: SATURDAY, OCTOBER 16, 1943

TREATMENT OF THYROTOXICOSIS WITH THIOUREA

In August we reviewed progress lately made in the study of exogenous substances which inhibit or modify the physiological activity of the thyroid gland. We noted that the goitrogenic effect of certain plants of the brassica family, observed several years ago, seems to be of the same general kind as the more recently discovered antithyroid effect of certain sulphur-containing compounds; it is characterised in laboratory animals by the somewhat odd combination of hypothyroidism and thyroid hyperplasia. In conclusion we referred to the suggestion of the American worker, E. B. **Astwood**, that thiourea and probably other similar compounds would be useful clinically in the treatment of hyperthyroidism. In the meantime further results have been recorded by R. H. **Williams** and G. W. **Bissell**[1] who report favourable results following treatment with thiouracil of nine patients showing thyrotoxicosis. The total daily dosage during the first three weeks of treatment was 1·0–1·2 grammes; during the second three weeks the dosage was gradually reduced. Within three to seven weeks from the initiation of treatment the clinical evidence of thyrotoxicosis had disappeared and the basal metabolic rate, initially + 88 to + 36, had reached normal levels. In 6 of the patients the thyroid gland progressively decreased in size and in 2 it ultimately returned to normal. No serious complications were encountered, though in 2 of the patients a slight transient swelling of the legs was observed in association with a slight increase in the serum chloride and a decrease in the carbon-dioxide combining powers of the blood. **Williams** and **Bissell** also made the interesting observation that the simultaneous administration of thiouracil does not prevent the increase in the basal metabolic rate caused by the administration of desiccated thyroid to myxœdematous subjects.

Today we are able to publish confirmatory observations in this country by Professor **Himsworth** who records remarkable alleviation, following administration of 1 g. of thiourea three times a week, of all the symptoms in a severe case of thyrotoxicosis. The details given leave little doubt of the highly specific effect of this substance in the treatment of what has hitherto been a refractory condition, and there is ample justification for his conclusion that in thiourea and compounds with a similar action the clinician has obtained agents superior to any previously available for the treatment of thyrotoxicosis. So far it appears that only thiourea and thiouracil have been used clinically, but a large number of other sulphur-containing substances can be demonstrated to have the same antithyroid effect in animals. Quite recently **Astwood**[2] has recorded the results of an extensive research on the relative effect of 106 chemical compounds. In each case the substance was administered in the food or drinking water for a period of 10 days, and the degree of thyroid hyperplasia estimated by gross and microscopic examination was used as a criterion. **Astwood** found that antithyroid activity was shown by two classes of substances—thiourea derivatives and certain aniline derivatives. Of the former, the following were more active than thiourea, in decreasing order of activity: 2-thiouracil, 2-thiobarbituric acid, *sym*-diethylthiourea and 5-benzal-2-thiohydantoin. The effective aniline derivatives included the sulphonamides, *p*-, *m*-, *o*-aminobenzoic acids, *p*-aminophenyl acetic acid and *p*-aminoacetanilide. Thiocyanates were found to cause thyroid enlargement only in the absence of added iodine, while organic cyanides were ineffective.

Great interest attaches to the mechanism whereby these antithyroid substances work, and any hypothesis must allow for two established facts: first, that the coincident administration of thyroxine abolishes the systemic effect, which is not due, therefore, to peripheral neutralisation of the effect of the thyroid hormone; secondly, that hypophysectomy abolishes the thyroid hyperplasia, but not, of course, the hypothyroidism. At present it is thought that the direct and immediate action of the substance is to interfere with the synthesis of thyroid hormone, either by preventing the iodination of tyrosine or by preventing the oxidative process required for the conjugation of two molecules of di-iodotyrosine to produce thyroxine. Since it is probable that in the normal gland these processes are enzymic in nature, the effect of the antithyroid substances may be anti-enzymic. Owing to the failure of the gland to elaborate thyroxine, there is a lack of the hormone in the body fluids and the animal becomes hypothyroid. In response to this condition the pituitary gland is stimulated to increase its thyrotrophic activity, and in turn the thyroid gland becomes hyperplastic through the increased secretion of thyrotrophic hormone. Nevertheless the hyperplasia of the thyroid gland is unable to relieve the hypothyroid condition, because of the blocking of the thyroxine-elaborating mechanism. If this interpretation is correct certain conclusions can be drawn. It is unlikely that the prevention of thyroxine synthesis is an all-or-nothing reaction; so a relation may be assumed between the dose of antithyroid substance and degree of hypothyroidism produced. It seems advisable, therefore, that in using the substance clinically to reduce hyperthyroidism close attention should be paid to dosage, with the aim of decreasing the synthesis of thyroxine to a normal level, but not below, so that there is no indirect effect in increasing thyroid hyperplasia. *If some such balance cannot* be achieved, then the question of the ultimate [illegible] of the treatment on the thyroid gland may [illegible] very important. Moreover the possibility [illegible] thyroid *effects of administration* of th[illegible] not be *lost sight of*, especially if th[illegible] substance on the thyroid lies in [illegible] action.

While thiourea and relate[illegible] be of great potential im[illegible] agents, the effects of [illegible] require careful study [illegible] be accepted without

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1. *Science*, 1943, [illegible], 156.
2. *J. Pharmacol.* 1943, 78, 79.

STERNAL PUNCTURE IN THE TROPICS

Two papers elsewhere in this issue remind us that malaria is a disease not only of the peripheral blood but also of the internal organs. Any means of extending our methods of observation beyond the study of blood-films is therefore, on the face of things, likely to be a useful aid to diagnosis. Both papers record a significant number of cases in which malaria parasites were found in preparations from the sternal marrow when they had not been found in blood-films even on several examinations. It is on this point that previous work shows lack of agreement: some authors have praised sternal puncture in the diagnosis of malaria, but others have found it of little value. While it cannot be said that the difference of opinion has now been finally settled, the two new reports present a stronger case in favour of sternal puncture than any other reports have presented against it. Since sternal puncture is a simple procedure, involving, in skilled hands, little discomfort to the patient, there is no reason why it should not be used where necessary in the diagnosis of malaria just as it has been used in the investigation of other tropical diseases. It is safer than puncture of either liver or spleen.

When a person appears to be dangerously ill with malaria, it is obviously wrong to withhold treatment until parasites are found, whether in blood-films or marrow smears; there are clearly occasions when clinical judgment must be a sufficient basis for energetic action if life is to be saved. If the patient has already taken quinine, parasites may be very hard to find, and they tend to be scanty in first attacks, especially of subtertian malaria. Nevertheless it is probable that in the vast majority of acute cases of malaria search of thick and thin blood-films repeated at intervals of 4–6 hours will disclose parasites without too much difficulty. It is not true, as some suppose, that it is a waste of time to look for parasites "until the fever goes up again." They are often to be found in the apyrexial interval between paroxysms, and perhaps the best time of all for finding them is when the temperature has begun to fall. It is also worth remembering that gametocytes may be discovered in the blood about 8–11 days after the initial fever, even when earlier forms have not been demonstrable. From these considerations it seems likely that the main use of sternal puncture in malarial diagnosis will lie in the elucidation of pyrexias of obscure origin and those conditions of vague ill health with mental irritability which play an important part in tropical practice.

In examining films it is important to follow a rigid discipline about what is and what is not a malaria parasite. If there is doubt the report should be negative. But an open mind is advisable if what look like definite but unusual forms of plasmodium are found. The cycle of development of the malaria parasite in man is still incompletely understood. Between the bite of the mosquito and the appearance of trophozoites in the red cells some 10 days later a stage of development takes place which has not yet been seen. It has been guessed that, as in bird malaria, the parasite may undergo an exo-erythrocytic cycle of development in the reticulo-endothelial system: and if this is so, examination of the sternal marrow before and between attacks may conceivably yield results of more than ordinary interest. Any appearances indicating the presence of non-pigmented schizonts would be especially suggestive. But before attributing any findings to exo-erythrocytic malaria parasites it would of course be a wise precaution to show the films to an experienced malariologist.

The scope of sternal puncture in tropical medicine appears to be almost unlimited. Marrow biopsy has already proved valuable in the diagnosis of kala-azar, filariasis and trypanosomiasis; cultures of the marrow in enteric fevers and in pyogenic infections may yield positive results when the blood is sterile; and it is also reported that viable plague bacilli may be more readily recovered from the marrow of dead rats than from their blood, glands or organs. Nor should it be forgotten that marrow biopsy can often disclose the information necessary for a proper understanding of the various forms of tropical anæmia. It is clear, however, that much work is still needed to define the usefulness of the method, and we hope it will be taken in hand. The world-wide scope of the present war must have put the opportunity for such an investigation within the reach of many keen doctors. Equipment is simple and the main requirement is a plan of combined operations between those who have access to patients and those who can look at a stained film and tell the difference between an artefact and the real thing.

LABORATORY STUDIES OF BURNS

Not the least benefit that war confers on medicine, is that it often persuades scientists to turn aside from fundamental research and apply their knowledge and experience to matters of immediate practical importance. This has happened in the case of burns. As soon as the full German offensive started on land and in the air, it was realised that burns would be one of the big problems of modern warfare. Surgeons may fairly claim credit for recognising quickly that the accepted methods of treatment were not only inadequate but also dangerous: they were being applied empirically under conditions far different from those of peace-time. The controversy that followed the first attacks on the use of tannic acid was in some ways unfortunate, but it had the merit of exposing our ignorance of the changes that accompany infliction of a burn. Even though there was general agreement on the scheme of systemic treatment this was largely based on the mistaken belief that the bulk of the fluid lost from the blood escapes from the surface of the burn.

The scientific study of burns in the laboratory led first to the devising of methods of producing standard lesions. One method was to dip the limb or part of the limb of an animal in water of known temperature for a given length of time.[1] An even more precise method is described by Peters[2]: here a burning iron is used, and its temperature is accurately controlled by a continuous flow of hot water through the device. Experience with both methods shows that considerable damage to the tissues can be done at relatively low temperatures. Leach, Peters, and Rossiter found that if the skin of an animal is burnt at 70° C. for one minute, the epidermis can then be lightly rubbed away to leave a moist surface comparable to the second-degree burn of man, and this type of burn was utilised in the study of the absorption of tannic acid by BARNES and ROSSITER.[3] Reports of the laboratory investigations also display interest in the existence of a burn toxin. PERLMANN and his associates [4] have shown by electrophoresis that a new protein appears in the serum of animals after they are burned. Because this protein is present in addition to, and not in place of, the other serum proteins, they suggest that it must come from the cells partially destroyed by the heat. From histological studies LEACH [2] concluded that there was evidence of two substances, one a nucleoprotein, leaving the cells in *the zone of partial destruction* below a burn. The nature of these substances remains unknown, but it is significant that their existence has been suggested by two independent lines of inquiry. Of equal interest is the fact that both groups of workers draw attention to this zone of partially destroyed cells at the edge of a burn. The study of what happens here may throw light on the reactions arising from these injuries.

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[1] Glenn, W. W. L., Peterson, D. K. and Drinker, C. K. *Surgery*, 1942, 12, 685.

[2] Leach, E. H., Peters, R. A. and Rossiter, R. J. *Quart. J. exp. Physiol.* 1943, 32, 67.

The American workers have gone on to suggest a rational method of treating burns.[5] They found that a dog with two scalded feet might lose the equivalent of a third of its blood-volume into the area round the burns, although there was no external fluid loss. This leakage continues for many hours, and they think that small repeated transfusions of plasma might be more efficacious than a single large one. If the circulation is fully loaded the amount of fluid lost is correspondingly larger; and they even suggest that a continuous and excessive leakage may tend to lengthen the period of increased capillary permeability. In seeking to reduce loss of fluid under the burn, they studied the effects of enclosing a freshly burnt limb of a dog in plaster-of-paris. As BARNES and TRUETA [6] had earlier demonstrated, this decreases the flow of lymph and prevents œdema. The fact that this can be accomplished without embarrassing the local circulation was evident because the oxygen content of the venous blood leaving a burnt foot was the same whether the foot was in plaster or left free to swell. They went on to show that healing took place very satisfactorily under the plaster casts, and that there was much less scar tissue and contracture in feet thus treated than in others burnt similarly but allowed to swell; when swelling was permitted there was a mass of coagulated exudate around the burn which later became organised. Their proposal that enclosure in plaster-of-paris should be tried in the treatment of burns in human beings has been anticipated in this country by BARNES [7] whose clinical results confirm their experimental findings. The circulation was not embarrassed, nor did stiffness and contracture follow immobilisation. Here, however, we have another example of the caution needed in translating experiment into practice. The dogs were allowed to run about in their plasters on recovery from the anæsthetic, and showed no signs of discomfort, but in man when a plaster was applied to a limb, it was essential to raise the limb to prevent pain from swelling within the cast.

It is to be hoped that more is yet to come from the laboratory that will point the way to improvements in the treatment of these difficult cases. Success and progress are most likely when treatment is controlled by an understanding of principles, and not by the mere mastery of details of technique.

Annotations

TRUETA ON WAR SURGERY

CREDIT for the closed plaster method has been laid at many doors. The Russians attribute it to Pirogoff, the French to Ollier, the Italians to Mettita, the Americans to Winnett Orr and the Spaniards to Trueta. Actually it has been slowly evolved through many centuries, but Trueta has been responsible for using it in its fully developed form in war. In his fine book [1] he points the way to the correct philosophical approach to war surgery. The young war surgeon, hacking at enormous wounds without much understanding, may come to look upon his work as carnage and in time forget the gentleness due to tissues which are in fact as delicate as flower petals. Trueta's theme is respect for the body's healing capacity. Methods of healing do not differ in war and peace, though our technique for assisting them may have to vary. His approach, however, is not that of blind faith; he continually analyses the healing process—for, as the President of the Royal College of Surgeons recently pointed out, the principles of how nature works don't *have to be invented: they are there to be discovered.* Trueta finds plaster the most convenient immobilising agent to obtain rest, but he insists that early surgery, excision and drainage are all necessary for success. His good early results were achieved before the days of local sulphonamides. He is just in his appraisal of the work [illegible] Winnett Orr's teaching [illegible] anged, drainage [illegible]; and especially to his warning to the surgeon "to watch the patient, not the wound." In an engaging chapter on the history of war surgery he reminds us of the English pioneers who have contributed to our understanding of the five cardinal principles: cleansing of the wound, Lister; the importance of rest, Hilton, Thomas, Robert Jones; drainage, Lister again, the first to use drainage tubing; excision of dead tissues, Milligan and Gray; prompt treatment, Florence Nightingale. In subsequent chapters Trueta uses this historical perspective to show how we arrived at modern views on wound healing. He has an ear for the telling phrase. He reminds us of the saying of Gamgee in 1853 that the degree of pressure required of a wound dressing is equal to "that with which one holds the hand of a lady when one greets her"; and of the dictum of Flemming in 1928 that "the best antiseptics are the natural defences of the body."

He describes the technique of excision of the wound explicitly. By many excision is still regarded as a sort of block dissection as if for cancer, perhaps done in the hope of removing all bacteria; others excise the track of the missile as though they were coring an apple. Trueta removes only what is dead or severely contused and begins by laying open the tissues so as to be able to see clearly and to differentiate the living from the dead. He gives precise technical details and insists that if the underlying principle is grasped "the quality of results is independent of the surgeon's manual skill." He advises the use of a fine-mesh dry gauze to pack the wound, because of its blotting-paper suction action into the plaster. This aspect of drainage has been rather overlooked in this war, the soft-paraffin pack being generally used. Winnett Orr said of the paraffin pack: "It is not a wick to drain the wound nor a plug to fill it like a cork. The design of the surgeon should be to make a saucer-like opening of the entire area." Trueta uses this pack only for the heavily infected wound where pus forms so rapidly that any form of "blotting paper" dressing is soon soaked; the pack then provides an easy path for overflow drainage. He tells the story of Pirogoff in the Crimean war, who, finding himself short of splints, cut patterns from sailcloth, dipped them in plaster and fitted them to the limb. Trueta himself prefers plasters cut to pattern; and they certainly make it possible to apply shoulder spicas and spinal jackets quickly and easily. The smooth convalescence of wounds in plaster is now well known; as Trueta says, "pain or even discomfort in the wound is a sign that something is amiss."

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[3] Barnes, J. M., and Rossiter, R. J. *Lancet*, 1943, ii, 218.

[4] [illegible] *J. clin.* [illegible]

[5] [illegible] p. 609.

[6] [illegible]

[7] [illegible]

[1] Principles and Practice of War Surgery. J. Trueta, MD Barcelona, Hon. DSC OXFD. William Heinemann, with Hamish Hamilton. Pp. 391. 42s.

HEART OF THE ATHLETE

The Americans indulge in sport more intensively than we do over here, and it is only natural that American physicians should interest themselves in the effect of such intensive athletics on the health, and particularly the hearts, of their young men and women. In this country similar problems will be raised after the war by the development of civilian physical training, which is certain to receive a fillip when our attentions can once more be turned to it. Wilce,[1] a physician with considerable experience of athletics as both coach and doctor, has made a 13 years' study of the history and cardiac size of American male athletes, whose ages ranged from 16 to 80 years, but 90% of whom were between 16 and 49. Basing his findings on heart areas and diameters obtained by orthodiagrams, and using the Hodges-Eyster normal standards, he found that about half (113 out of 233) of his athletes had hearts that were absolutely enlarged. On strict criteria, which included history, and clinical and functional findings, only 37 of the 233 hearts could be classified as normal; of these normal hearts, 7 were considered to be enlarged as the result of athletics and, in Wilce's words, "would qualify as true athletic or work hearts, or normal hearts physiologically enlarged by exercise." Clinically and functionally these hearts were normal, their owners being active athletes, and Wilce sees no reason why such athletes should not continue playing games, though he has to admit that the eventual outcome of such enlargement is not yet known. In two cases such enlargement was actually seen to develop. One was a high-school basket-ball star, whose heart over a period of three years gradually increased in size, though it never became absolutely enlarged; he is still a star player. The other was an Olympic champion sprinter, whose heart, under especially strenuous training conditions, was found to change in area and contour, developing left axis-deviation in the electrocardiogram; two years after discontinuing Olympic training the heart showed slight increase in size.

A closely allied difficulty arises when a man with an organically damaged heart is yet able to indulge in hard physical exercise, the cardiac lesion being only found accidentally on routine examination. Wilce refers to a college freshman with chronic rheumatic heart disease and a cardiac area enlarged by 65%, who was able to take part efficiently in all high-school sports and freshman's football. Another of his cases was a schoolboy, a keen basket-ball player, who was found to have a damaged heart and refused to accept the advice given to him to cease playing games; three months later his cardiac area was found to have increased from 13% to 31% above normal.

Our knowledge of the effects of repeated violent exercise is still meagre and empirical, and the normal limits of cardiac area, as measured by the orthodiagram, are so wide that isolated observations are of little value. Wilce's findings suggest that they are even wider than has been supposed. On the other hand, serial measurements are undoubtedly of value in deciding whether cardiac enlargement has occurred, and such measurements, carried out over a long period, would provide much information as to whether slight cardiac enlargement does follow indulgence in athletics and if so whether it has any deleterious effect on the function of the heart in later years. This knowledge would help in deciding how much exercise the child or adolescent can safely undertake. The youngster with an organically damaged heart must obviously be considerably restricted in his exertions, though care must be taken to maintain a balance between protecting the heart and limiting its owner's activities unnecessarily. How many boys have had their schooldays ruined by a doctor's verdict that they have a "strained heart" and must therefore not play games! The obvious aim is to allow the maximum liberty compatible with the functional state of his heart, and the benefit of the doubt should be in favour of more exercise.

Finally there is the unsolved problem of the effect of infections, such as influenza, on the heart. Must exercise be restricted during convalescence? The answer seems to be "yes," which places considerable responsibility on the medical officer with adolescents under his care. Clinicians, in conjunction with physiologists and pathologists, should give this urgent question the attention it deserves. The war-time experience of the Service medical departments should provide a mass of data on which to base further investigations.

CONTRACEPTION IN A RURAL AREA

One of the prewar "problem" areas of the USA was the Southern Appalachians, a region of some 110,000 square miles, overlapping nine States but lying mainly in Virginia, West Virginia, Kentucky and Tennessee, and devoted chiefly to mining and farming. The chronic depression of the former occupation and the low productivity of the latter, coupled with the highest fertility-rate in the United States, has led inevitably to a picture of acute poverty. Family limitation, as Beebe points out in a recently published study,[1] cannot bring economic and social salvation to such a region but it may at least be one means of alleviating the pressure upon the standards of living. To test the possibilities in such a rural community, a county was chosen and a service inaugurated with a public health nurse to instruct married women applicants in the use of a vaginal jelly, to keep them supplied free of charge and to secure reproductive histories before and after the contraceptive efforts. In all some 1300 women availed themselves of the service during the years 1936–38 and were followed up for an average period of 21 months. The normal high fertility-rate of the area is hardly surprising since the previous histories show that over 80% of the women had been married before they were 20 years of age, the average reported frequency of coitus was twice a week, and methods of contraception though used on an increasing scale by the younger members of the population were certainly not widespread and of somewhat indifferent efficiency. In the period of observation following the introduction of the service 658 conceptions took place, whereas 1145 would have been expected if the previous pregnancy rates at different intervals of the marriage had continued to prevail; in other words on this basis some 40% of the expected conceptions had been prevented. Though quite substantial it may well be doubted whether success of this order over a relatively short period of time is sufficient to induce women to continue with a particular method over a long period. Indeed in this study only a third of the women were still using the prescribed method after

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[1] Wilce, J. W. *Amer. Heart J.* 1943, 25, 613.

[1] Contraception and Fertility in the Southern Appalachians. G. W. Beebe, PH.D. (Baillière. Pp. 274. 11s.)

2 years. This is hardly surprising since the vaginal jelly proved to be little, if any, more effective than methods already known to the patients and the only reason for its relative success was that more women practised contraception more of the time. On the other hand, as Beebe's figures show, one effect of the service is to increase generally the interest in family limitation so that more contraceptive precautions of all kinds ensue and not only the prescribed method; such interest may be more lasting. To be at all effective, however, in such an area he concludes that any contraceptive service must include a regular follow-up and the provision of more than one method to overcome the heavy loss of patients dissatisfied with the initial prescription. The present population outlook suggests that we may shortly be much more concerned in promoting the birth-rate than in depressing it; but at a time when it is still necessary to adjust fertility to economic conditions rather than the reverse, this account of the success that may attend efforts in a rural community is relevant, and adds something to our knowledge of reproduction in the absence of contraception.

NURSING TUBERCLE

King Edward's Hospital Fund for London has made some practical suggestions[1] for the prevention of tuberculosis among nursing staff in general hospitals. There is nothing revolutionary about them: they are plain common-sense. But it would be a great advance in current practice if they were universally applied. The memo points out that the nurse in a general hospital is not so well safeguarded against tuberculosis infection as are nurses working in sanatoriums. There is proper equipment for sterilising sputum mugs, china and handkerchiefs in a sanatorium, and the nurse does much of her work in the open air. In general hospitals it is often the duty of a new and untrained student nurse to deal with sputum mugs; and handkerchiefs are sometimes allowed to accumulate in a patient's locker until his relatives come for them. A sink may be contaminated if china from infectious cases is washed there, even though it is kept separate from other china. The memo suggests that in the preliminary training school and throughout their hospital training all nurses should be taught by sister-tutors and ward sisters the precautions necessary in the nursing of tuberculous patients, and the way in which infection in respiratory conditions is spread. Nurses should learn how the patient can avoid distributing droplet infection; she should realise that the hands of those nursing positive cases must be washed often, and that no books or papers belonging to such patients should be lent to others in the ward. She should remove the overall or apron she wears in the ward before she goes to meals. She should be encouraged to report at once any cough or other mild respiratory symptom which she notices in herself, and especially any persistent feeling of fatigue. All nurses under 30 nursing tuberculous cases should be examined by X rays at three-monthly intervals. Every patient in the wards who is coughing up sputum should be nursed "on precautions," if possible in a side ward, until tubercle is excluded. Wherever possible a boiler should be installed so that all sputum mugs can be sterilised before they are cleaned. The hospital should provide the patients with handkerchiefs and should have special arrangements for laundering them. A third- or fourth-year nurse should be responsible for collecting them daily in a pail containing disinfectant. Pillowslips and sheets should also be collected and sterilised with proper precautions, and methods of sweeping and dusting round beds should be such as to avoid dissemination of infection in dust. If there is no steriliser for china, the crockery used by infectious cases should be washed in a separate sink.

Perhaps the most important single item in these sensible rules is that requiring a nurse to report early with slight symptoms; and here some matrons and ward sisters need education. At present it is only too common for a nurse to hide symptoms which appear trifling because she fears—and with justice—the reproaches of a short-staffed and short-tempered senior. But the attack of tubercle is often insidious, and in dealing with it over-caution is praiseworthy and heroism always misplaced.

SOVIET MEDICINE IN THE FIELD

A FILM of the Red Army Medical Services shown at the Royal College of Surgeons on Oct. 8 illustrates the care of wounded from their rescue by sledge to their re-training for battle. Though it was made two years ago and introduces nothing very novel in surgical technique, it shows how some of the medical problems of winter warfare have been overcome on the Eastern Front, and it has pleasant splashes of local colour. As in peace-time Russia, doctors and their auxiliaries seem to be lavishly supplied with white raiment; the Russian hospital ward tends to be less formal and more homely than ours; and we see an official artist making a portrait of a hero as he lies in bed. Particularly striking are the scenes where casualties reaching the base are made clean again with hair-cuts, baths and showers; and later there are instructive pictures of men undergoing rehabilitation, including devices for restoring precision of movement.

The film was introduced by Prof. Semon Sarkisov, who said that the good offices of Madame Maisky had made it available to the Anglo-Soviet Medical Council. The English version of the commentary, by Dr. K. W. C. Sinclair-Loutit, was spoken by Mr. Wilfred Pickles. Sir Alfred Webb-Johnson, president of the college, expressed the thanks of the gathering for what they had received.

THE first tribunal to hear appeals against pensions awards under the 1943 Act will sit on Oct. 18 at the Royal Courts of Justice. The panel of medical men from which the tribunals will be drawn consists at present of R. G. Blair, MB; R. M. Dannatt, FRCS; Lieut.-Colonel P. C. T. Davy, CMG, MB; Colonel C. M. Drew, DSO, MB; Colonel J. Heatly-Spencer, CBE, FRCP; Vincent Norman, MD; B. H. Pain, MB; Major-General Sir Cuthbert Sprawson, CIE, FRCP; A. R. Thompson, FRCS; and J. F. Venables, DM. Further appointments will be announced by the Lord Chancellor from time to time.

Surgeon Rear-Admiral Sir THOMAS DESMOND GIMLETTE, who died at Epsom on Oct. 4, at the age of 85, was inspector-general in charge of the Royal Naval Hospital, Haslar, from 1908 to 1911 when he was created KCB. Retiring shortly before the last war, he returned to the Service in 1914 to take charge of the Admiralty Recruiting Headquarters.

Dr. RALSTON PATERSON is on his way to Sydney, having received an invitation from the Premier of New South Wales to advise on the organisation and equipment of a Cancer Institute there. The institute which is to be built in Sydney will serve the whole of the state. Dr. Edith Paterson, who accompanies her husband, will be engaged on the research and propaganda aspects of the problem. They expect to be away from England for four months or so.

MEDICAL SOCIETY OF LONDON.—On Monday, Oct. 18, at 5 P.M. Prof. G. Grey Turner will deliver his presidential address at 11, Chandos Street, W.1. His subject is to be transplantation of the ureter.

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[1] [illegible]

Special Articles

CONDITIONS NECESSARY FOR CONSULTANT WORK

(FROM A CORRESPONDENT)

THE conditions under which a consultant can do his work best may be considered, on the broadest level, as embodying the same principles as apply to the members of any large profession or occupation, working within a partially planned democratic political and economic system; or, in more detailed terms, they can be considered to show the problem of a specialised group of doctors working in a more organised way than formerly for the same public and the same employers broadly as before the war. As the latter view involves a mass of detail which must depend in large measure on acceptance of certain general principles, I propose here only to suggest some principles which can be used as a guide in the difficult, and essential, business of exact planning.

The consultant must conduct his work so that he has (1) satisfactory incentives; (2) satisfactory freedom from handicaps; and (3) satisfactory checks and stimuli.

INCENTIVES

The incentives would offer him certain prized advantages to be got from doing his work as well as he possibly can. It would be false in such a profession as medicine to rate remuneration first, or very high, among incentives. Salaries must, however, be adequate to meet the appropriate standards of a professional worker with good qualifications, and should be such as most consultants would recognise to be fair and commensurate with the duties of the post. More important incentives will be:—

(a) The *interest* of one's clinical work and devotion to it, which can only be achieved if there is an adequate range of clinical material, adequate freedom in dealing with it and adequate opportunities for progress and individual initiative.

(b) *Status and reputation.*—Able men must have opportunities for obtaining appropriate recognition of good work they have done, and opportunities for just promotion, which may be as much, or more, a matter of raised status than of raised pay.

FREEDOM

Freedom from handicaps will ensure that the consultant has freedom of action in all professional activities (e.g. freedom of access to patients, freedom of professional conduct and association). He must not be subject to interference by unqualified persons in the performance of his medical duties. He must not be dependent on the goodwill and countenance of an individual, nor liable to be retarded or advanced because of opinions formed about him at second hand (e.g. by a non-medical employing body acting on the advice of a medical official). He must be able to express opinions on medical matters even if they are inacceptable to his superiors, and he must not be constrained to make all his approaches to those controlling his conditions of work, through a single, narrow, "official channel," (e.g. an administrative officer or superintendent). In fixing terms of service and other conditions of employment—including hospital arrangements—which are medical or have plain medical consequences, the consultants shall have a voice, and the subsequent right of appeal. Where, for example, it is agreed that the employing authority may properly require a consultant to work in one place for a long period, or to move to another area, there must be safeguards against unreasonable or arbitrary action by the authority, and the consultant should have a recognised court of appeal in disputed cases.

It must be recognised that whatever comprehensive system is adopted there are sure to be handicaps and demerits of many kinds which will only become apparent when the system is working, just as we have come to know the serious defects in control of health services by local authorities under what probably appeared to those who drew it up an admirable scheme. Clearly therefore maximum care must be taken to avoid the known defects of the existing systems under which consultants are employed, and to attempt to foresee the defects which are implicit in either the new systems proposed or in the remedies instituted as amendments of the old system. Also as in all planning, it will have to be recognised that in the beginning there are bound to be not only achievements but also errors and mistakes, and that the method is one of trial and error in regard to all but the broadest issues. Consequently the system must not be a rigid one, nor installed as if in perpetuity, but must allow explicitly for constant modification in the light of experience: machinery to this end is an essential part of any such plan.

STIMULI AND CHECKS

Stimuli and checks must chiefly aim to preserve the direct relationship between doctor and patient, and to ensure that the consultant does not fall into the errors of outlook and practice which beset any professional group (or indeed any occupational group) left to its own devices, without the advantage of public guidance and effective scrutiny. The evil effects of a corporation or guild structure for professional groups, as in the Italian Fascist state, are sufficiently well known.

Hitherto wide freedom of choice of doctor by those who can pay has acted (among its other good functions) as a rough and ready means of penalising the consultant who does not satisfy the public's legitimate needs. But it will probably be less operative in the future, and though consultants will no doubt continue to have very high standards of professional duty they will be deprived of this steady check on the development of an arrogant caste attitude—"give the public what is good for them, whether they like it or not"—an attitude which, sometimes masked by concomitant propaganda, seems to develop in any self-sufficient and wholly autonomous occupational group (the "technocrat's" point of view).

Some better means must therefore be devised for keeping the consultant and the public closely in touch than has hitherto existed, for example, between the outpatient clientele and the consultant staff of voluntary hospitals (where an inarticulate public opinion often had no means of bringing about a better standard of amenities approximate to those of private consultant practice). Similarly, the population of many boroughs and counties failed to demand and obtain, through their representatives on the municipal or county authority, necessary improvements in the hospitals conducted by the local authority; neither the doctors nor the patients could in fact obtain the conditions which both more or less wanted. There must then be a close link between medical services and those for whom they are provided. It might be said, indeed, that close supervision and active criticism by the public is a necessary feature of good consultant medical services, just as it is, say, of good transport services.

Even more necessary, on the other hand, is mutual confidence between doctors and patients; this will be all the more essential when the freedom of choice of consultant may be further restricted in some areas. There must therefore be adequate administrative machinery to ensure that those among the public who urge any change in the consultant services provided shall feel that their suggestions and criticisms are weighed as fairly as possible and if approved will be adopted. Equally there must be machinery to ensure that consultants are not hampered, nor their time frittered away in rebutting frivolous or irresponsible criticism and trying out ill-advised suggestions. There must therefore be:—

(a) Good *health education* bringing about, among other things, a good relationship between consultants and the public; and of course there must be a good relationship, and a smoothly working code of conduct, between consultants and other doctors or workers in the health services.

(b) Good *arbiters* and *intermediaries*—a mixed body of doctors and laymen for example, before whom local problems in the health services can be thrashed out and ventilated. Of course local conditions will determine to what extent all this can be brought about in a particular area; there will be very great divergencies and what would be a thoroughly good arrangement in one region would be as bad as could be in another. The general pattern might be that advocated by Sidney and Beatrice Webb in their very pertinent chapter on the "Reorganisation of the Vocational World."

CONCLUSION

I recognise that generalities of this sort are alone of little use in deciding how good consultant services may be ensured, but unless general principles are first agreed on, I think the discussion is in danger of getting bogged in detail or of taking the sterile, negative line of pointing out all the objections to any national scheme that has been proposed, particularly if the scheme contemplates local authorities as "[illegible] sponsible for adapting centrally [illegible] al conditions I believe a detailed [illegible] up based on the foregoing principles

I have not dealt at all with the broad administrative questions which are often the chief subject of discussion in regard to health services—e g, the desirability of keeping separate the four functions (*a*) drawing up by experts, of the scheme of organisation, (*b*) adoption of the scheme by the competent authority, (*c*) execution of the scheme (*d*) supervision of its working, the degree of control to be exercised by local authorities, the constitution and powers of technical advisory boards such as the Central Medical Board One great objection, however, must be faced Any organised system of consultant services (which will no doubt depart from the prewar pattern) will mean a restriction of the consultant's freedom whatever safeguards are insisted on The question is whether this restriction of his freedom is in the long run advantageous to the national health for the sake of which it is imposed, and whether he is prepared to make the sacrifice on this and other grounds of public or private benefit

For the consultant, as for the other people concerned in any genuinely national medical service, the issues will not be clear [illegible] een the different var[illegible] between unwanted [illegible] hoices, the choices [illegible] many, and finally b[illegible] and unessential choices

PALESTINE

TYPHUS CONTROL

THERE have been 23 deaths from a typhus outbreak during the past 8 months in Palestine The epidemic affected chiefly the southern districts and the Department of Health has prepared special delousing units and portable showers for use if it is necessary to cope with further cases The infection is thought to have been imported from neighbouring countries especially Egypt High wages in Palestine have attracted Egyptian labour, not all of it legally admitted Murine typhus carried by rats is endemic in Palestine but this epidemic was caused [illegible] serious and had not [illegible] of the last war A [illegible] was used with good effect, and a special laboratory for research into and control of typhus has been opened by the [illegible] he Hadassah Hospital at Je[illegible] head of the department of [illegible] been put in charge of it

HOSPITAL DEVELOPMENT

The Yarkon Hospital at Tel Aviv may be taken over shortly as a government hospital to serve rural areas At present it is a municipal hospital, serving as an annexe to the congested city hospital The number of beds may be raised to 80–100 The shortage of beds in the Tel Aviv municipal general hospital is so severe that Dr T Gruschka the director, has resigned He found the responsibility too great of selecting patients for the two or three vacancies daily from a group of 20 or 30 applicants The shortage of hospital accommo-[illegible], and it is pleasant to read that [illegible] presented £30 000 for the con-[illegible] Gaza to receive those who are in need

SLUM CLEARANCE

Mr Henry Kendall town planning adviser to the Palestinian Government proposes that improvement trusts for slum clearance should be set up in all the large towns Similar trusts have done good work in Bombay, Madras and Singapore Funds are provided either by the Government and local authorities or by means of loans The town planning order of 1930 is now outdated and needs amending

CITRUS LEATHER

The Agricultural Experimental Station in Rechoboth, near Tel Aviv, has made a preparation of dried oranges to which the name citrus leather has been given Samples intended mainly for the manufacture of marmalade have been sent to England for tests The vitamin content and the flavour of the fruit are preserved, and even after the war citrus leather should make it possible to spread the marmalade making season over the whole year instead of concentrating it into a few months to correspond with the ripening of the fruit For the moment it should mean a great saving in shipping space and in expense Research on this problem has been carried on at the station for two years and has been supported by the Citrus Marketing Board If results are satisfactory a commission from the Ministry of Food to study methods of dehydration in the Middle East is expected

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In England Now

A Running Commentary by Peripatetic Correspondents

EVEN Mr Churchill gives us hope that by 1945 or 1946 we may be within sight of the turning point But the Ministry of Labour and National Service judging by Form FG 11, is expecting a long war "The physical requirements for a member of a stirrup pump team," it says, "are regarded as—fair sight (with glasses if worn) and hearing, ability to work a stirrup pump to carry a bucket of water for 25 years on level ground and to climb two flights of stairs at a reasonable pace without distress" Those who kick the bucket will be disqualified

* * *

Why the psychologists decided to become the psychiatrists is known only [illegible] ash for both the meaning [illegible] hia trist" present difficul[illegible] the apostles of scientific medicine are scarce, but an erudite major—most Army psychiatrists are majors—was able to put his finger on the Greek word *ἰατρός*, meaning a healer, as the key to derivation And then the pronunciation *psych*iatrist, the *mind* healer, psychi*atrist* the mind *healer*, or [illegible] healer? Following the Greek [illegible] accent on the last syllable but [illegible] though the syllable accentuated is only a connecting link in a compound word From those who did not worry themselves with painstaking investigations the word invited the anglicism trick cyclist and got it

Well why not? In ancient Thessaly, the land of horse breeders, they used to maintain a public veterinarian agreeably known as the hippiatros I rather favour the ending "tros" A hippiatros for me, calls up a cunning union of horse and man and albatross—a centaur with wings, a Pegasus among vets Might not a psychiatros fly equally high? But no the rôle of winged soul healer might tell in time, even on the super ego of a trick cyclist And few of them would look their best in the kit

By a natural transition one begins to wonder why other branches of the profession have not labelled themselves as healers Are they too modest? Do they only *know* about their special diseases, making no claim to mend them? The only others who openly promise a cure are the pediatrists If the profession is to be homogeneous in nomenclature, as in so many other directions envisaged by the planners, all branches should fall into line We must prepare to accept [illegible] ophthalmiatros [illegible] trost, who is enc[illegible] cross

Anyhow, these long complicated words are multiplying too fast Shall we ruthlessly apply the pruning knife of elision and produce such pleasant and easy words as psychist, otist and laryngist? Or must we go on mumbling compound words until the trick cyclists in their old age have to pedal their tricycles to a shop where the tricyclologist diagnoses the trouble and the tricychiatrist effects the repair?

* * *

I had a beastly dream last night I dreamt that I was a peripatetic correspondent and in the [illegible] my wanderings had happened to spend a night [illegible] farmhouse At the gate stood two [illegible] churns awaiting despatch to a well know[illegible] philanthropic outlook may be summed up

"Pure Pasteurisation for Pale People." So I thought I'd take a look through the other end of the milk bottle and see how this invigorating beverage first saw the light of day.

The farmyard was one of those quaint old farmyards—entirely unpaved with a midden-heap at the far end, needless to say the end nearest the cow-shed. There was plenty of mud everywhere; where there was no mud there was a neat heap of cow-dung, and there were numerous deep puddles which even the recent heavy rains could not rid of their stale urinous smell. The cow-shed was also quaint and old, very old, with an occasional gap in its wooden walls where a plank had finally given up all attempt at keeping out the elements and had rotted away. The inside of these walls was a dull grey, giving the impression that they had received a coating of whitewash at one time, but that the decorator had long since had to retire in face of the overwhelming onslaught of the droppings and splashings of his bovine charges. A nearby stream provided an excellent water-supply, the only criticism here being that the water was pumped from an intake situated about ten yards downstream from where the cattle waded, drank and performed other natural functions. Incidentally, this water was used in the cooler—Oh, yes; the milk was cooled—and the overflow from the cooler was allowed to run into the empty churns returned by the People's Pasteurising Co., "to give them a good rinse out, and to make sure that they were clean." I also noticed several milk bottles being washed out with water from the aforementioned stream, and I was informed that these bottles were used for the "pure" milk that was sent up to the village school every day—"It is only right that the children should have fresh milk. I reckon this 'ere pasteurisation takes all the goodness out." The cardboard caps of these bottles were kept in an old cigar-box (lidless), and were put on by hand. Milking was by hand, no pipes or other complicated apparatus to get dirty (or keep clean), and a good milker the dairyman proved to be. I don't know that I quite approved of his filthy old coat or his ragged cap, worn to keep his head from being dirtied by the cow's flank, which appeared never to have been washed; nor, for that matter, had any other part of her hind-quarters. The use of an open bucket seemed hardly in keeping with what I had been taught as a student of public health, but I did see the bucket being scrubbed afterwards in the scullery with soap, a rather bald scrubbing-brush and well-water in a chipped and rusty once-enamelled bowl. Two snatches of conversation are worth placing on record. "Go and get us a drop of milk, my dear. Use this saucepan, not those bottles. I know the saucepan is clean, I washed it myself." "My husband misses the lard I used to give him. He always found it so good for the sores on the cows' udders."

It *was* a beastly dream.

* * *

Here are some lines on Planners I found the other day in Wordsworth's *Prelude*:

These mighty workmen of our later age
Who, with a broad highway, have overbridged
The froward chaos of futurity,
Tamed to their bidding . . .
. . . . . . the keepers of our time,
The guides and wardens of our faculties,
Sages who in their prescience would control
All accidents, and to the very road
Which they have fashioned would confine us down,
Like engines; when will their presumption learn,
That in the unreasoning progress of the world
A wiser spirit is at work for us,
A better eye than theirs, most prodigal
Of blessings, and most studious of our good,
Even in what seem our most unfruitful hours ?

* * *

Is there any foundation for the belief that doctors tend to die of the diseases in which they specialise? Up to a point there is obvious reason for such an association. The victim of tubercle is naturally drawn towards sanatorium work, so the odds of an ultimate defeat by the bacillus are considerable. The sufferer from almost any disability has his interest stimulated by the strongest of all motives and so acquires a special knowledge which he profitably employs in his professional life. Cardiac lesions are common enough, so that the occasional occurrence in a cardiologist is merely within the laws of averages. And if you are a general practitioner something in your line must turn up sooner or later. Yet queer things do happen—when, for example, a neurosurgeon succumbs to a brain tumour. I once enjoyed a most persuasive discourse from a philosophic colleague who was convinced of this relationship on psychosomatic grounds, especially in regard to coronary infarction. I had to suggest that the practice of gynæcology would, according to him, be the best way to ensure immortality or at least comparative immunity from the dangers of specialisation.

Public Health

Fevers in Dublin

Dr. C. J. McSweeney, in his report for 1942 of the Cork Street Hospital, records a fatality-rate for diphtheria of 5·51%—the lowest since *gravis* strains appeared in Dublin. He is inclined to attribute this less to immunisation than to a shift in incidence (noticed also in England) to the older age-groups. Among 581 confirmed diphtheria admissions a surprisingly high number (133) gave a history of immunisation three months or more previously, but it should be noted that 35% or more of the children immunised in Dublin are estimated to have received only a single dose of alum-precipitated toxoid. Of streptococcal diseases scarlet fever had its customary mortality of less than 1% and for the fourth year in succession no patient died in the hospital from erysipelas—a result largely due to sulphonamide therapy. There were 8 deaths among 34 cases of meningococcal meningitis, but four occurred within 15 hours of admission before specific treatment could have any reasonable chance of success. The high mortality (20·4%) for whooping-cough suggests that only complicated cases were admitted; bronchopneumonia was present in some 60% of cases treated. An outbreak of poliomyelitis in the autumn produced 15 cases of the bulbar type, all fatal. In contrast there was only one death among 44 spinal cases, with some residual paralysis in 6. Treatment of respiratory paralysis in 18 cases by a Bragg-Paul apparatus led to 4 recoveries, presumably in the spinal type of disease. Bulbar respiratory paralysis—whether arising in polio, or (less commonly) in diphtheria—is rarely amenable to mechanical aids. Gastro-enteritis appeared among young children in epidemic form for the second year in succession, with a general death-rate of 43·1% (40·7% in 1941). Of 75 deaths 73 were in the first year of life; nearly 90% of the infants admitted were bottle fed. Sulphaguanidine was given to 72 unselected cases without appearing to influence the course of the disease—a result supported in the main by controlled investigations elsewhere.

Manchester considers Health Centres

The city council of Manchester has unanimously approved a report on health centres presented by Dr. C. Metcalfe Brown, the medical officer of health. In it he sets out the present position in the city: there are 22 maternity and child welfare clinics, many of them housed in drab, unsuitable and even relatively dirty quarters with inadequate or primitive sanitary arrangements. There are also 10 general school clinics, each with a dental section, one special, one dental, one child guidance and one orthopædic clinic; these, in Manchester, come under the education authority. The report suggests that the city's needs would be met by one main health centre, and four subsidiary centres for every 50,000 people; on this basis 15 main and 60 subsidiary centres will be required. The report offers detailed suggestions for a main centre. including plans, the feeling being that such main centres should be built first. The type of centre contemplated is purely for municipal services, and does not provide consulting-rooms for general practitioners: the report suggests that if general-practitioner health centres are to be set up they should be linked with the municipal centres to ensure efficiency with economy.

It is not possible to choose sites for centres, because these will depend on the town planning scheme, now being prepared. The design of the municipal health centre is generous, with a lofty entrance hall reached through a forecourt with playing space for children. Corridors radiate from the entrance to all ground-floor departments, and lifts serve the two upper floors. On the ground floor there would be a maternity and child welfare section embodying antenatal and

room and a dispensary.

the main front would hou

a venereal disease clinic, a day nursery for 40 children,

and street accidents, and a lecture theatre complete the ground floor. On the first floor there would be dental and X-ray units, a skin department, an orthopædic

treatment,

ooms, and

ay nursery.

the senior

medical officer, health visitors, midwives, clerical staff, medical records and library. Dr. Brown makes it clear that these are merely suggestions, open to amendment

basis for discussion.

E. Tylecote remarked

mmittee's first instalment of reconstruction. Others were to come.

The Second Quarter

The birth-rate in England and Wales during the second quarter of this year (17·5 per 1000) was higher than in any similar quarter since 1926, but the marriage-rate fell to 15·9, the lowest since the second quarter of 1937. The death-rate, based on the mid-1939 population, was 11·0 per 1000, compared with an average of 12·00 for the same quarters during the quinquennium preceding 1942. Infant mortality, at 46 per 1000 live births, was the lowest ever recorded for this period of the year. In recording these facts in his Quarterly Return, the Registrar-General recalls that during the last war the birth-rate fell continuously, from 24·5 in the second quarter of 1914 to 18·2 in the second quarter of 1918.

Infectious Disease in England and Wales

WEEK ENDED OCT. 2

Notifications.—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 2956; whooping-cough, 1583; diphtheria, 724; paratyphoid, 7; typhoid, 7; measles (excluding rubella), 465; pneumonia (primary or influenzal), 400; puerperal pyrexia, 143; cerebrospinal fever, 30; poliomyelitis, 13; polio-encephalitis, 3; encephalitis lethargica, 3; dysentery, 337; ophthalmia neonatorum, 80. No case of cholera, plague or typhus fever was notified during the week.

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Deaths.—In 126 great towns there were no deaths from measles, scarlet fever or enteric fever, 10 (1) from whooping-cough, 10 (1) from diphtheria, 69 (10) from diarrhœa and enteritis under two years, and 12 (1) from influenza. The figures in parentheses are those for London itself.

The number of stillbirths notified during the week was 205 (corresponding to a rate of 31 per thousand total births), including 24 in London.

A GRANDSON AT GREAT ORMOND STREET.—Dr. Andrew Bar

for

Sir

honorary staff in 1875. Sir Thomas celebrated his 98th birthday on Sept. 4.

SOCIALIST MEDICAL ASSOCIATION.—Dr. Horace Joules is to take the chair at the SMA conference on a national service for health which is to be held on Sunday, Oct. 17, at 3 PM, at the Conway Hall, Red Lion Square, London, W.C.1. The speakers are to be Mr. Hector McNeil, MP, and Mr. Somerville Hastings.

Letters to the Editor

CONTRACTING OUT

SIR,—The Representative Body of the BMA paid little attention to one of the most important and debatable questions which will engage the attention of the profession when the white-paper comes before us.

The question of "contracting out" was first raised at the Annual Representative Meeting of 1942, when by a very narrow majority the representatives decided that the Government should provide a comprehensive medical service available to the whole community. To this, as a sort of afterthought, was added a rider to the effect that any patient, though entitled to treatment under the scheme as a statutory right without direct charge, should be at liberty to obtain his medical attention privately, without reference to the national scheme, on direct payment of fees to the doctor concerned. The doctor would be entitled to retain such fees, which would be an addition to his basic remuneration in the National Service. The little discussion that followed did not appear to make any very deep impression on the meeting, and the rider was passed without much, if any, opposition. Its implications have, perhaps, been insufficiently realised.

The main arguments of its protagonists seem to be that if a state service were set up there would be a large number of what are now private patients who would resent being included, nolens volens; and that many of this class of patients would prefer to employ their doctor in a private capacity much as they do at present, paying for his services as rendered, although they would be entitled to his services under the national scheme without direct payment. At first sight this seems reasonable, and in accordance with democratic principles; but there are snags. Let us consider the matter from the standpoint of patients.

Jones has an income of say £500–600 per annum, and a family including children of school age. To such a patient, a long illness or a surgical operation is a nightmare, as the expenses involved would have a disastrous effect on his budget, unless, of course, he makes use of some form of contributory scheme. He is, therefore, delighted with a state health insurance scheme, which relieves him of all anxiety in return for a regular contribution which he can afford. The state assures him that he is now provided with the most complete and efficient medical service that money can buy, and puts, in addition, all forms of specialist and ancillary treatment at his disposal.

By devious means, however, he learns that his employer, although he is as much entitled to participation in the scheme as Jones is himself, and has paid his social security contribution, has decided to consult his doctor in a private capacity. It may very well be the same doctor who attends Jones and his family.

What will Jones think? Logic must lead him to conclude that his employer would not pay for something to which he is already entitled unless he is getting something for his money. From here it is a short step to suppose that the "complete medical service" cannot really be complete, or there would be nothing for which his employer need or could pay extra. It matters not whether he is employing the doctor he has chosen under the national scheme or one working outside it. If the former, it will appear to Jones that Dr. X dispenses two classes of medicine, one to those who pay him and the other to those who do not—however untrue in actual fact this may be. Or, if the latter, it will suggest to him two classes of doctor, those employed by the state and those

n the preference of

others haven't got.

distinction will be drawn between "state" medicine and "private" medicine, or between "state" doctor and "private" doctor—in each case to the eventual detriment of the first named.

Now let us consider the case of another patient.

Smith is somewhat better off than Jones, and maybe he is also a bit of a snob. At all events he elects to contract out of the national scheme. All goes well till he has a long and expensive illness. In due course, as he sees the shadow of his doctor's bill lengthening on the ceiling above his bed, he remembers that the extensive medical attention he is receiving is after all his by right, and that he need not really be paying for it at all. He therefore decides that he will stop contracting out the next day—thus giving rise to a certain amount of confusion in his doctor's record-keeping, and perhaps not a little ill-feeling. Here, then, the door is open to abuse, for there are bound to be a certain number of Smiths in the world who will contract out while they are well and very quickly contract in again as soon as there is the prospect of a long illness.

It is not inapposite to compare the proposed National Health Service with the present educational system. Here again the state provides facilities for every child in the country whose parents choose to send him to the "state" school. At the same time there are other schools run by private enterprise where a child may be sent on payment of more or less considerable fees. The number of such schools at present thriving in this country in spite of the high level of taxation is the measure of their popularity. The number of boys at Eton, we read, is increasing. Rightly or wrongly, parents believe they are getting something extra for their money by sending their children to such a school, and often they make great sacrifices so that their son may enjoy "the advantages of a public-school education." A similar point of view will certainly exist if state medicine and private medicine are allowed to parade side by side.

It is permissible to draw another analogy. Medical attention is an essential commodity. In this time of war, the Government has undertaken the responsibility of seeing that essential commodities, such as food and clothing, are made equally available to the whole community. In this case there is no provision for those who can afford it to procure such commodities privately by extra payment. Some do, and those people are rightly stigmatised and despised for their attempts to circumvent the Government's policy by resort to the black market.

I do not dispute that there are many people who would object to having a state service thrust upon them, whether they like it or not, or that there would be many who would prefer to pay their doctor privately despite the fact that they are entitled to his attention free of charge. In the inauguration and growth of such a scheme as this, some difficulties are bound to arise. But surely it is only a matter of education and propaganda to convince these people that a state service would provide for their complete medical needs, and that they would have nothing to gain by seeking attention outside the scheme.

The argument that, if Lady B. is prepared to do so, she should be entitled to buy a slice of her doctor's time over and above what is necessary for her purely medical needs is not a very good one. It is very doubtful if the patient is in the long run any better for indulging in such an extravagance, and this slice of time would be much better spent attending to other patients whose ill health makes their claim more valid.

I have recently had a certain amount of experience of public relations work, and at several meetings with the general public I have put this question of contracting out. The general impression has been, almost without exception, that if this were permitted, the profession would be suspected of trying to retain private practice for their own interests and thus lining their own pockets at the expense of those who could afford to pay.

The allied question whether a patient should be allowed to purchase additional comforts and amenities in the form of private accommodation is admirably dealt with in your issue of Sept. 25. This does not constitute contracting out, and there can be no valid objection to it. But there would be a real objection to the surgeon receiving an additional fee from that patient, because this would be the specialist equivalent to contracting out in general practice and all the arguments against it are equally valid in this case. The method of payment of the specialist has not been suggested as yet, but his remuneration from the state scheme, by whatever method, should be such as to cover all patients he is asked to attend, irrespective of their income. It is thus plainly absurd that he should be paid twice for the same case, once by the patient just because he happens to be affluent, and once by the state.

Lastly, may I say a word on how contracting out is likely to affect the medical profession. To permit it would place a weapon of great power in the hands of those responsible for fixing the remuneration of doctors if any form of state medical service comes into being, which might be used to our grave disadvantage. We are all anxious to preserve for our profession a standard of living to which we are accustomed. The government department concerned with remuneration will almost certainly take the attitude that if we retain private practice it is unnecessary to grant us on behalf of our "state" work an income comparable to that which we enjoy at present. We shall be expected in other words to make it up to this figure by the fees which we garner from those of our patients who elect to contract out. Very well, but will there be this measure of private practice to fall back upon in twenty years' time? The Government have stated that they envisage the gradual extinction of private practice (vide Sir John Anderson's speech to the Commons in the early part of this year), and Sir William Beveridge (para. 431 of his report) says: "The possible scope of private general practice will be so restricted that it may not appear worth while to preserve it." If the state scheme is a success, private practice must disappear as people realise that there is nothing to be gained by contracting out of it. Where then will be our standby? We shall be reduced to remuneration which was not at its inception intended to recompense us fully for the work that we do.

Our negotiations with the Government have two main functions, to produce an efficient medical service for the nation and to ensure that this provides an adequate standard of living for the doctors of the future. We shall fail in the second of these two responsibilities if we permit the adoption of a service available to the whole community with facilities for contracting out.

One final word. Let no-one read into these remarks a plea for a full-time state salaried service. Nevertheless, in spite of a resolution passed by the Representative Body, it is very probable that Assumption B of the Beveridge Plan will be carried out, and health provision made for the whole nation. Let us concede that if this does come to pass we must, however regretfully, say goodbye to private practice as we know it at present. The two are incompatible.

Eastbourne. A. LUCAS-YOUNG.

MEDICINE AND THE COMMUNITY

SIR,—Like you I had noted and regretted that the proceedings of the recent BMA conference were rather negative, but it had not struck me that this was because we were "rather tired and rather grey," which is no dishonour when most of our younger members are in the forces. I rather thought that it was because, being practising physicians, we were more concerned with practical things than impractical dreams. It frequently falls to the lot of a doctor to have to bring his patient to earth, and sometimes this is necessary to prolong his life.

Faced as we were by the nostrum of one-track politicians we turned it down as decisively as we should the prescription of the one-remedy doctor. A full-time salaried medical service is mainly supported by the Labour Party and those associated with the TUC. If these will consider how they would welcome a suggestion by the doctors that, for the good of society, all manual workers should in future work on flat-time rates, no overtime, Sunday time, bonuses or piece rates, they will be helped to understand how appropriate and acceptable is their incursion into medical politics.

The BMA meeting was, in fact, clouded by the forthcoming white-paper. By rights this should have been anticipated as the dawn of a new day, but in view of our experience of the Ministry of Health the reverse was the case. Its record is, as Lord Dawson said, one of "obscurantism," and though he, after personal contact with Mr. Brown, is convinced that its outlook is now more helpful, Mr. Brown's last suggestion has probably antagonised the profession more than any act in the Ministry's history. It is small wonder therefore that the attitude of the conference was negative.

The sad part is that there is really no difference in aims. We all want the public to have the best service possible, and available as easily as possible. Those who are actually doing the work should have some idea as to how this is to be brought about, and it is only when doctors and Ministry work together and cease regarding each other as was common between employers and employees until recently that real progress is likely to take place. If Mr. Brown, as the employer, would give heed to the experience of personnel management in industry, I do not think he would find it difficult to win the profession to a less negative attitude, and no service can be satisfactory to the public unless conditions of employment for the doctors are satisfactory too.

Winsford, Cheshire W. N. LEAK.

FEVERS IN THE FAR EAST

SIR,—Like others I have read with appreciation Dr. P. B. Wilkinson's observations (*Lancet*, 1942, ii, 67 and 1943, i, 210) on smallpox and cholera in Hong-Kong. Now that so many young medical officers are moving east without having seen smallpox, cholera or typhus, they must be prepared in whatever manner possible. May I stress this? *Take care your vaccinations take.* In recent years in Hankow I buried four Europeans (a British naval rating, a British consular official, an American naval dental surgeon and an American ex-senator tourist) who had all been "vaccinated" less than five years before and thought they had protection which they had not. Incidentally in China we had *no* trouble with conscientious objectors to vaccination—they contract the disease, and the question, for them, is settled whatever the outcome.

In 1900 I studied my first epidemic of cholera in our hospital in Hankow under Dr. J. A. Thomson, now of Harrogate. He will doubtless recall this, and will pardon me for suggesting that few in the United Kingdom would be better qualified to instruct young MOs in this disease and its treatment. The outbreak, caused by filthy ice, was brought to the European sisters and patients in the hospital by milk one Sunday morning. Those on full diet suffered severely, and we had hard work with our new saline-infusion apparatus (Cox's) to pull them through. One naval rating succumbed: he had a renal abscess. [illegible] day happened to be o[illegible] days that was milk [illegible] *so mildly affected that had we not been looking for signs,* we should likely have failed to recognise them. They complained of [illegible] shrivelling of f[illegible] chamber of the [illegible] was required.

Men going to work in the east should be provided with Cox's outfit and taught to use it. Essentially it is a small filter-candle which acts as a siphon; it is boiled with the saline to be used for the intravenous infusion. One outfit can be used for two patients at one time; the lamp, with automatic regulation of temperature, is not necessary. The doctor new to this work tends to give too little fluid and too m[illegible] should not be over a pint. [illegible] fast after the first quart, [illegible] kidney action is resumed. [illegible] fluids, then fluid per venam should be half-normal saline with 5% glucose. Excess of bicarbonate should be avoided. The doctor should use a glass cannula and tie it in; relapse may set in during the night and it is better that a trickle of fluid should continue. It is unwise to remove the vein cannula at night until recovery is well established.

Durban, Natal. A. H. SKINNER.

THE PROPER PLACE FOR CHILDREN

SIR,—Your peripatetic correspondent of Sept. 4 (p. 301) remarked: "It just isn't true that all small children will thrive in a day nursery." I am afraid many people cannot see round this problem: they are blinded by their own immediate fear or delight over their own successful effort. They do not look at the main facts when they say nurseries for the under-twos are bad or dangerous, that they will break up family [illegible] hers often [illegible] ightened; [illegible] heir fears; [illegible] this leads [illegible] prefer to work to give sound foundations in building home life; many women are uniting in demanding better education in child-care, better conditions for mothers, the setting up of nurseries as extensions of the home so that parents can go out together and the mothers need not be on duty—or tenterhooks—for 24 hours daily for ever. I was grateful when the *Lancet* quoted my views expressed at a meeting of the London Association of the Medical Women's Federation. *The doctors were all so full of fear*; my experience has taught me that they are wrong if proper conditions are given in the nurseries.

Piccadilly, W.1. H. V. ENTHOVEN,
Hon. Sec., National Society of Children's Nurseries.

FEEDING WITH AMINO-ACIDS

SIR,—In his letter of Aug. 28 Professor Brunschwig of Chicago states that, as far as he knows, no-one has ever thought of this method of alimentation as a substitute for the natural one per os. Over twenty years ago I was struck with the difficulty of feeding patients by nutrient enema, and I suggested to my teachers of physiology that the obvious thing to do would be to administer intravenously the breakdown products of the protein molecule—namely, the amino-acids. My enthusiasm was dashed by vague replies of possible violent reactions, and I am sorry now that I did not test this method out myself, for I still feel we have here a valuable method of feeding patients who cannot for various reasons be fed by the ordinary route.

Solihull. E. S. PAGE.

DUPLICATED OR REDUPLICATED

SIR,—Writing of accessory heart sounds in your issue of Sept. 25 a correspondent tells us categorically that "*re*duplicated means quadrupled." This statement seems to have been made without verification, and by superficial analogy with such words as reconsider, regenerate and resume. A doctor speaking thus in the sphere of philology is comparable with a patient in the sphere of medicine who should tell us categorically that his disseminated sclerosis had been caused by a heavy fall. The Latin prefix *re* has some half-dozen meanings which have descended into English. Here are 3 of them:—

1. "Again," which has misled your correspondent.
2. "Duly," "properly" or "as it should be by rights," as in render, relegate, remit.
3. The merely intensive meaning of "thoroughly" or "and no mistake about it," as in refrigerate, replete and reduplicate.

Clearly in usage (3) the prefix adds nothing to the essential meaning of the main word. The Shorter *Oxford English Dictionary tells us that reduplicate* means "make double" or "redouble," and that redouble means "double." The words iterate and reiterate provide an exactly similar instance of the same usage.

Medical School, London Hospital, E.1. W. J. PENMAN.

A NEW ASSOCIATION OF PHYSICISTS.—An inaugural meeting of the Hospital Physicists Association, held at the British Institute of Radiology on Sept. 24, was attended by 37 physicists drawn from hospitals all over the country. The aims of the new body are to discuss matters of mutual interest to those engaged in a branch of scientific work which has grown up largely in the last 30 years. Membership is open to physicists attached to hospitals, medical schools, and medical or biological research departments. The meeting was followed, on Sept. 25, by visits to the Middlesex, Royal Cancer and Westminster Hospitals, and the afternoon session was devoted to papers.

Dr. H. T. Flint spoke on technique with the various radium gram units; Prof. F. L. Hopwood gave an account of the betatron; Prof. Gilbert Stead discussed teaching for the diplomas and Prof. Sidney Russ dealt with the professional equipment of a hospital physicist. Professor Russ was elected chairman for the first year with Mr. C. W. Wilson, PH D, of Westminster Hospital as honorary secretary. Meetings are to be held thrice yearly at least. Professor Russ reminded his audience that the first full-time appointment as physicist to the hospital was made 30 years ago. Today between 50 and 60 physicists are engaged in hospital or medical research work.

Sir JOHN ORR thought that if the nations accepted the recommendations and carried them out, there would be an ascending spiral of prosperity and expansion of world industry and agriculture. Some people doubted whether the proposals would be carried out. The British Government had already accepted them and were bound to carry them out, but it was important that there should be a well-informed and strong public opinion in favour of their adoption if they were to be made fully effective.

THE DISAPPOINTING CHESTNUT

EVERY autumn new horse-chestnuts, shining like old mahogany, challenge our ingenuity: there *must* be some use for anything which looks so attractive. Boys believe they have found the answer in the game of conkers, but their elders remain jealous and dissatisfied. Temperton[1] has recently been experimenting with horse-chestnuts as poultry food, encouraged by their chemical composition which closely resembles that of barley. The trouble is in the flavour. Esculin, a glycoside, is one of the constituents; it is a saponin and produces a soap-like foam in the mouth when cooked horse-chestnuts are chewed. It leaves a sweet flavour later turning to a bitter after-taste due to the presence of *l*-rhamnose and gallotannic acid. Four groups of four pullets each were fed with horse-chestnuts on the following plan: group 1, raw chestnuts; group 2, boiled chestnuts; group 3, chestnuts steeped in water for 48 hours and cooked; group 4, chestnuts leached in warm water for 48 hours after cooking. Chestnuts in the various forms were added at the rate of 2 oz. per head to a mash consisting of 4 oz. of laying meal. The hens disliked them; even when attempts were made to get rid of the bitter taste. Group 1 threw the bits of chestnut out of the trough and ate only the meal. Groups 2, 3 and 4 were unable to discriminate in this way because the cooked chestnuts were intimately mixed with the meal, so they left the whole ration untouched. A new set of hungry birds who had not eaten for 24 hours were offered all four rations, and after a preliminary peck refused to touch them. Besides being unpleasant to eat, horse-chestnuts are difficult to keep. They had been collected by local school-children, and were stored in thin layers on the floor of an airy shed; yet even so, at least half were attacked by fungi and could not be used for the experiment. On the whole the horse-chestnut tree seems to have evolved a fool (and man) proof seed. Perhaps after all the proper use for horse-chestnuts is to make more chestnut trees.

University of Oxford

Dr. S. A. Sarkisov, professor of neuropathology in the Moscow Brain Institute, will deliver a lecture at the department of human anatomy, at noon on Friday, Oct. 22, on problems of cortical localisation.

University of Sheffield

At recent examinations the following were successful:

MD.—R. B. Knowles.

Final Examination for MB, ChB (Parts II and III).—J. W. Greaves, Arthur Pickin, and Winifred M. Smith.

Royal Society of Tropical Medicine and Hygiene

A meeting will be held at 26, Portland Place, London, W.1, at 3 PM on Thursday, Oct. 21. Sir Harold Scott will deliver his presidential address on the slave-trade and its influence in the spread of tropical disease.

A National Health Service

Dr. Stark Murray will give three lectures to the Central London Fabian Society on this subject at 7.30 PM on Tuesdays at the Artworkers' Guild Hall, 6, Queen Square, W.C.1. On Nov. 23 he will speak on a personal health service, on Dec. 7 on administration and control, and on Dec. 21 on the ultimate aim.

Post-war Nutritional Relief

The Nutrition Society is holding a conference on this subject at the London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1, on Saturday, Nov. 6. Lord Horder will be in the chair and Prof. J. R. Marrack will speak on past experience and present position, Mr. John Hammond, FRS, on problems of production, Miss E. M. M. Hume on opportunities for nutritional research. Further details of this meeting may be obtained from the hon. secretary, Mr. Leslie J. Harris, D SC, Nutritional Laboratory, Milton Road, Cambridge.

British Association of Physical Medicine

A meeting will be held at 11, Chandos Street, London, W.1, on Wednesday, Oct. 20, at 5 PM, when Lord Horder will deliver the inaugural presidential address.

British Institute of Philosophy

On Friday, Oct. 22, at 4.30 PM, Prof. J. W. Harvey will address the institute on community purpose and the lessons of Nazism. Cards of admission may be had from the director of studies at University Hall, 14, Gordon Square, W.C.1, where the meeting will be held.

Royal Society of Medicine

There will be a general meeting of fellows at 5 PM on Tuesday Oct. 19. At 2.30 PM., on Oct. 20, Mr. J. T. Edwards, D SC, will give his presidential address to the section of comparative medicine on the limitations and uses of the comparative method in medicine. At the same hour at the section of physical medicine Dr. Philippe Bauwens will deliver his presidential address on electrodiagnostic interpretations and misinterpretation in nerve injuries. At 4.30 PM, on Oct. 21, at the section of neurology, Prof. S. P. Bedson, FRS, will speak on the present position with regard to the epidemiology of poliomyelitis, and Prof. H. J. Seddon on poliomyelitis in Malta. On Oct. 22 at 3 PM Sir Weldon Dalrymple-Champneys is to give his presidential address to the section of epidemiology and state medicine. He has chosen as his subject an examination of the place of the doctor in the state, from ancient times to the present, together with some speculation in regard to the future. On the same day at 4.30 PM Sir Joseph Barcroft, FRS, will read a paper to section of disease in children on fœtal movement especially in relation to the onset of respiration.

Medical Casualties

The following casualties among medical officers have been announced:

Missing, believed killed.—Surgeon Lieutenant C. M. Davies, MRCS, RNVR; Lieut.-Colonel Hartas Foxton, MC, MB LEEDS, RAMC; and Surgeon Lieutenant G. C. Glennie, MB EDIN., RNVR.

Prisoners of War.—Surgeon Lieutenant J. P. Corcoran, MB NUI, RN; and Colonel V. H. Wardle, MC, LRCP, RAMC.

Births, Marriages and Deaths

BIRTHS

BOYLE.—On Oct. 1, at Bromley, the wife of Captain A. C. Boyle, RAMC—a daughter.

BRADBURY.—On Oct. 4, at Belfast, the wife of Surgeon Lieut.-Commander E. B. Bradbury, RN—a daughter.

COURT.—On Sept. 15, in London, the wife of Dr. Donald Court—a daughter.

EDWARDS.—On Oct. 7, at Woodford, Essex, the wife of Dr. Alan Edwards—a daughter.

KEELE.—On Oct. 3, in London, the wife of Dr. C. A. Keele—a son.

KELLETT CARDING.—On Oct. 8, at Redhill, the wife of Captain D. M. Kellett Carding, RAMC—a son.

KEY.—On Sept. 30, in Edinburgh, the wife of Captain James Key, RAMC—a son.

PLATT.—On Oct. 7, in London, the wife of Dr. B. S. Platt—a son.

POCHIN.—On Oct. 3, at Poole, the wife of Dr. E. E. Pochin—a son.

WATSON.—On Oct. 2, at Woking, the wife of Surgeon Lieutenant Howard Watson, RNVR—a daughter.

WOOD.—On Oct. 1, in Oxford, the wife of Surgeon Lieutenant E. J. Wood, RNVR—a son.

WOOLMER.—On Oct. 3, at Aberdeen, the wife of Surgeon Commander R. F. Woolmer, RNVR—a daughter.

MARRIAGES

BROCKLEBANK—RENDELL.—On Sept. 25, at Netley, John Alfred Brocklebank, MD, MRCP, major RAMC, to Winifred Rosa Rendell of Edmonton, Alberta.

GOODDY—DEAS.—On Oct. 7, in London, William Walton Gooddy, MB, RAMC, to Edda Deas, MB, RAMC.

LAWSON—MARLOW.—On Oct. 2, in London, David Lawson, MRCS, to Belinda Marlow.

DEATHS

BEDINGFIELD.—On Sept. 28, at Rugby, Henry Bedingfield, DSO, MD EDIN., MRCP, formerly of Leeds.

BUCK.—On Oct. 8, Walter Buck, LRCPE, aged 79.

COCK.—On Oct. 9, at Appledore, Kent, Frederick William Cock, MD DURH., JP, aged 85.

DONALDSON.—On Oct. 2, at Wisborough Green, Sussex, John Donaldson, LRCPE, lieut.-colonel late RAMC, aged 83.

GIBBS.—On Oct. 5, at Thames Ditton, Charles Gibbs, FRCS.

GIMLETTE.—On Oct. 4, at Epsom, Sir Thomas Gimlette, KCB, MRCS, surgeon rear-admiral RN.

NIXEY.—On Oct. 6, Essex Frank Wake Nixey, MB EDIN., medical superintendent of St. John's Hospital, S.W.11.

WILSON.—On Oct. 7, at Ongar, Geoffrey Remington Wilson, MB CAMB., JP.

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[1] Temperton, H. *Nature, Lond.* Sept. 25, p. 345.

SPONTANEOUS SUBARACHNOID HÆMORRHAGE

A REVIEW OF 150 CASES

O. GAULTER MAGEE, F R C P E, D P H
TEMP. PRINCIPAL MEDICAL OFFICER, MINISTRY OF PENSIONS

IT is now twenty years since Symonds (1923) applied the spur to British interest in this subject by his publications in the *Quarterly Journal of Medicine* and *Guy's Hospital Reports*. The general demand for greater refinement in diagnosis, the aid afforded by radiology with its exploitation of opaque media in the delicate business of radiography and the determination of surgery to play a part have jointly served to sustain the interest then aroused, and a fairly large volume of literature on the anatomy and pathology of the circle of Willis has accumulated.

ANATOMY AND PATHOLOGY

Apart from the well-known derivation and construction of the circle of Willis there are less obvious features which are unique in anatomical architecture and of these must be cited the singular setting of this vascular circuit in a fluid space dependent only on the hydrostatic support of the fluid in the cisterna interpeduncularis, the acute angles of offset of the branches and, it is now sug-

mural abnormality.

The cerebral vessels belong to the medium-sized or muscular group of arteries and much controversy has surrounded the relative importance of structural abnormality of the media of these vessels as forming "loci minoris resistentia

A decade ago Fo

and his colleagues

pathologists, were

agreement on the

degeneration as the most important factor. The excellent histological, embryological and hydrodynamic studies of Forbus on the circle of Willis resulted in the convincing argument that the principal cause of aneurysm of the cerebral arteries is a muscular defect of the media located in that portion of the vessel wall forming the acute angle of bifurcation, that this defect dates from intra-uterine life, and that the point of maximum pressure in the vessel wall under ordinary conditions of circulation corresponds with the site of medial defect. Finally, Forbus concluded that, though the muscular defect is the basis of dilatation, degeneration of the internal elastic lamina due to continual overstretching is the final stage in the production of the sac.

But these views did not command universal acceptance. It has been emphasised that muscular defect at points of bifurcation is a relatively common arrangement in arteries other than the cerebral, especially the coronary and mesenteric vessels; but it is only in the cerebral arteries that one finds aneurysmal sequelæ. In this

branches alone. The conflict of opinion as to structural and degenerative effects as the major issue in causation led Glynn (1910) to re-examine the question. As a result of the careful examination of the bifurcations of vessels in 10 cases of aneurysm of the circle and in 15 controls without aneurysm, and by simple inflation experiments to determine the relative importance of muscular and elastic tissue in resisting distension he concluded that medial defects per se were of little

of the elastic

cerebral vessels,

the media and

this tissue more

vulnerable to injury and therefore to degeneration.

ANALYSIS OF MATERIAL

The present inquiry was first directed to the influence of physical stress as a possible ætiological factor in the rupture of congenital aneurysm in the circle of Willis and the consequent presence of blood in the subarachnoid space. Most of the cases collected have been presented to me in the course of my routine work in adjudicating on claims to pension made by members of the Forces or civil defence services, but I have included a small number seen personally in civil practice. The data from the major fraction of the series (that from the Services) have been obtained entirely from the examination of records and in no instance have I seen a Service case clinically. The cases have been carefully selected to include only examples of spontaneous rupture or—in the few cases where minor trauma could not be excluded—of aneurysm demonstrated at autopsy. Gross head injury has been absolutely excluded and care taken to eliminate those cases of intracerebral hæmorrhage which may, by the violence of their occurrence, plough their way inwards or outwards to reach the subarachnoid space. The numerous data at my disposal forced a much wider review of the subject than was entailed in the original terms of reference and it has been possible to examine the material presented on the wider plan outlined below.

1. *Age and sex.*—Certain limitations will be obvious under this heading—e.g., the general age-limits of recruitment for the Armed Forces and the preponderance of men in the earlier days of the war. It may be stated, however, that of 85 cases occurring during the first six months of 1942 there were only 2 females, and this at a time when recruitment of women must have reached a high level.

Having regard to these limitations set by recruitment, the impact of subarachnoid hæmorrhage on the age-groups is shown in table I. The conclusion to be drawn is that the incidence is low under the age of 20 and thereafter rises and continues to rise sharply throughout the age-groups under consideration. The influence of age on recurrence, death, good functional recovery and recovery with such complications as hemiplegia, vertigo, fits, and diplopia, has also been examined (table II).

TABLE I—AGE-INCIDENCE IN 150 CASES

Age (years)	Cases	Per cent	Approximate age-grouping (per cent. in Forces during 1914–18 war
Under 20	9	6	24
21–30	76	50	52
31–40	56	37	23
41–50	9	6	2

TABLE II—INFLUENCE OF AGE ON DEATH, RECURRENCE AND RECOVERY

Age in years	Cases of hæmorrhage	Recurrences	Deaths	Recovery	
				Good	*Partial*
Under 20	9	3	5	3	1
21–30	76	25	37	26	13
31–40	56	21	37	15	4
41–50	9	1	5	1	3
Totals	150	50	84	45	21

In the 21–30 age-group recurrence followed in 33%, death in 48% and a good recovery in about 35%. For the 31–40 age-group the results are somewhat less favourable, recurrence following in 37%, death in [illegible] and a good recovery in only 27%. In the 41–50 group good recovery is rare.

2. *Previous health and family history.*—No [illegible] of value, apart from the headaches and [illegible] discussed later, was gained from the [illegible] recorded former personal or family history

errors 22, epilepsy 4, rheumatic infection including tonsillitis 9, as episodes in the previous personal history, would appear to represent the incidence in a fair cross-section of the population.

3. *Mode of onset, trauma, exertion, rest.*—Extensive inquiries have been made in each case as to contemporary or previous trauma or physical strain. Examples of hæmorrhage into the subarachnoid space as an accompaniment of gross cerebral trauma have been carefully excluded from the series, but in 8 cases out of the 150 a comparatively minor trauma would seem to demand recognition as the determining ætiological factor. The type of trauma is that associated with heading a football, or a simple fall; symptoms developed in under five minutes in 3 cases, in under three days in 3 cases, in a week in one case. In the 8th example a rather more severe fall on the back of the head about two months previously had been followed by a period of indefinite ill health until the major catastrophe. Of the 8 cases 6 died and autopsy was carried out in 5, in all of which aneurysms were found. The following case is a good example of apparently trivial injury giving rise to serious cerebral complications.

A man, aged 48, was involved in a motor accident on March 3, 1942. He received no apparent injury and remembered every detail of the incident. He was certain he had received no head injury. He complained of slight headache very soon afterwards but nevertheless continued his tour of duty and even filled in the accident form. The following day he thought he was a little clumsy with his right hand. On March 5 he fainted, vomited, and presented clinical signs of raised intracranial pressure. A few days later a lumbar puncture was done and a bloody fluid was found. His condition varied over the next three or four days, but on March 12 he was noted to have papillœdema and on March 13 he developed right hemiplegia, became drowsy and had neck rigidity. For the next fortnight he had several attacks of drowsiness with diplopia and visual hallucinations of the complex type—seeing figures, semicircles, &c. He died on March 29. Post-mortem examination showed a small saccular aneurysm of the right anterior cerebral artery ruptured into the right frontal lobe.

In regard to exertion and effort 15 cases only claimed or could be related to physical strain, and a liberal interpretation of the expression is required to embrace even this number. Four of the subjects were playing football (this number does not include 2 others who headed a wet football and are included under trauma), 2 were cycling, 2 were doing physical training exercises, one driver was stricken while pulling a heavy canvas over his lorry, a furniture remover while carrying a heavy chest, one soldier collapsed on a cross-country run and another while lifting a cart-wheel. It will no doubt be admitted that in few of the above 12 cases, in which the hæmorrhage commenced *immediately*, could support be given to a serious claim of unusual stress as a precipitating factor. In the remaining 3 cases of *delayed* onset the relationship is even more obscure. In one case symptoms commenced in the evening following a full day's military training, one was claimed to be due to exceptionally hard work as a stoker and the third to the heavy work of an Army baker, who had to lift heavy weights and to perform strenuous acts of kneading.

As against the postulated perils of physical strain there were 135 cases (90%) to which no such cause could be assigned nor indeed was claimed. These subjects were going about their common tasks when they were overtaken. In 43 of them there is a clear and definite history of onset while in bed, or rising from bed, or in the home or office or cinema; 10 more of them were out walking, one was dancing. There is thus pressing evidence against acceptance of physical strain as an ætiological factor.

4. *Premonitory symptoms or antecedent signs.*—These were sought in headache, ocular anomalies and in any other notable cerebral or somatic disturbance. 18 of the cases gave a history of headache for months or years and one half of them attached the label of migraine; 3 of the 18 no doubt deserved the designation of ophthalmoplegic migraine, for the premonitory subjective visual disturbance was followed by ocular palsy when the major attack developed. One other case deserves description not only its migrainous accompaniments but also for its demonstration of the truth of the argument of the preceding paragraph on rest and strain.

A van driver, aged 25, had tonsillectomy at the age of 6, since when he had been subject to three or four "bilious attacks" per year. These attacks start with blurred vision, are followed by a sense of numbness of the hands, especially the left, and culminate in vomiting and headache. The attacks last six hours. On July 1, 1941, he had a severe attack, became aphasic and then unconscious. He was detained three weeks in hospital. On July 9, 1942, he was an inpatient awaiting a second tonsillectomy when, at 7 AM one morning, he felt sick, complained of a severe headache, became drowsy and then unconscious. On examination he was found to have neck rigidity, a positive Kernig and a bloody CSF. Next day he passed again from unconsciousness to drowsiness and complained of severe frontal and occipital headache. No deviation from the normal was found in the optic discs and in all other respects the central nervous system appeared to have recovered. The blood-pressure was 110/70 mm. Hg and the pulse-rate 50. From this date he made a gradual recovery and by July 31 presented no sign whatever of any abnormality.

Apart from the headaches and ocular anomalies the only other findings on inquiry into premonitory symptoms was the complaint of notable lumbar pain in 3 cases—one week, three weeks and eight weeks before the major attack.

5. *Presenting symptoms and signs.*—The main signs and symptoms can be seen in table III. Among the 16 ophthalmoplegic cases aneurysm was found in one by arteriography; with one exception (in which the basilar was affected) the aneurysms in these cases lay in the anterior half of the circle or its branches. Albuminuria, often massive, was found in 15 cases and glycosuria in 7. In all cases these findings were transitory. Hæmatemesis or coffee-ground vomit occurred in 3 cases. There were no other abnormal or unusual signs.

TABLE III—PRESENTING SYMPTOMS, SIGNS AND OTHER FINDINGS IN 150 CASES OF SUBARACHNOID HÆMORRHAGE

Findings	Cases	Remarks
Pyrexia	9	Usually 100–103° F.; one case 106° F.
Pulse-rate—		
Over 70	5	Out of 29 observations.
40–60	23	
Headache	105	14 occipital.
Loss of consciousness ..	75	—
Neck rigidity	77	—
Convulsions	19	—
Vomiting	64	—
Vertigo	25	—
Photophobia	11	—
Diplopia	8	5 came to autopsy: aneurysm demonstrated.
Objective ophthalmoplegia	8	
Papillœdema	11	Noted on 1st day in 5 cases; latest case appeared on 13th day.
Vascular hypertension—		
Diastolic over 100 mm. Hg	7	Blood-pressure recorded in 63 cases.
Systolic over 150 ..	11	
Wassermann or Kahn test	35	All negative.

TABLE IV—RELATION OF FINDINGS TO PROGNOSIS IN 150 CASES OF SUBARACHNOID HÆMORRHAGE

—	Cases	Died	Mortality-rate per cent
Loss of consciousness	78	48	61
Convulsions ..	17	9	53
Vomiting	64	34	53
Papillœdema ..	11	6	54
Unconsciousness—			
With vomiting ..	33	21	63
With convulsions ..	12	5	58

In the whole series of 150 cases the mortality-rate was 56% (84 deaths). It would be natural to inquire in a serious condition of this type whether any aid in prognosis may be obtained from a rapid survey of the clinical picture as found on first presentation, so an attempt has been made to glean some precognition from the presence or absence of unconsciousness, convulsions, vomiting, papillœdema or the blood-pressure reading (table IV). [illegible] worsening in outlook [illegible] nothing of great [illegible] a result of these inquiries, and table V seems to justify the conclusion that no help in prognosis is to be obtained from the [illegible] case either by lumbar [illegible] nination the CSF was frankly hæmorrhagic or xanthochromic. This finding is the corner-stone of the present investigation. No other findings of value eventuated.

TABLE V—THE SYSTOLIC BLOOD-PRESSURE (IN MM. HG) IN 63 CASES

—	Under 100	100–110	110–120	120–130	130–140	140–150	Over 150
Recovered	2	8	6	5	9	1	5
Died ..	0	1	5	8	5	2	6
Total ..	2	9	11	13	14	3	11

7. *Autopsy reports.*—Of the 84 fatal cases, 58 were brought to autopsy and in 43 a ruptured aneurysm was found. In two cases 2 aneurysms were found, in one 3 aneurysms were found and in a fourth several are mentioned but the number is not specified. As regards site, the following analysis shows that they are much more common in the anterior half of the circle and also on the right side than on the left.

SITE OF ANEURYSM IN 43 CASES OF RUPTURE

Left anterior cerebral artery ..	2	Anterior half of circle = 27
Right anterior cerebral ..	5	
Left middle cerebral ..	5	
Right middle cerebral ..	7	
Anterior communicating ..	8	
Left vertebral ..	1	Posterior half of circle = 9
Right vertebral ..	0	
Basilar ..	4	
Left posterior cerebral ..	0	
[illegible]	2	
[illegible]	0	
[illegible]	2	
[illegible]	7	

The incidence on the right side of the circle is twice as heavy as on the left side. This is reflected clinically in [illegible] right-sided paralyses. This incidence is the reverse of the common experience [illegible] of other varieties. There [illegible] post-mortem findings. Co[illegible] was found in 1 case, cystic kidneys in 1, the thymus gland was reported as "present" in 2 cases, a duodenal ulcer was active in 1 case and in 2 others atheroma of cerebral or other vessels noted.

[illegible] the [illegible] the [illegible] tion of recurrence to age, blood-pressure, and to the site of aneurysm in cases which came to autopsy, and to the general significance of persisting symptoms. The prognosis in cases of recurrence has also been examined. A second hæmorrhage occurred in 50 of the 150 cases. This is a high exposure to jeopardy but it is even more alarming when mention is made of the fact that of the 150 subjects here considered 52 died in the primary attack. The 50 recurrences therefore were found among 98 survivors of the first attack. And 32 more failed to recover. Recurrences have been subjected to careful scrutiny with regard to: the latent period; the result; the site of aneurysm; and the relation to rest and exercise. The last-named is a feature of the discussion.

The latent period and results are best appreciated by the study of table VI, from which it will be seen that the major incidence of the second attack falls in the first month with a peak in the third week. [illegible] and then fall sharply. As to the site of aneurysm found in those cases of recurrence which were subjected t autopsy the same preference for side and anterior positi is noted as in cases fatal at the first attack. No particular vessel appears specially prone to recurrent blee unless it be the right middle cerebral which provided out of 12 examples of aneurysm found at autopsy in this group of repeated rupture.

TABLE VI—LATENT PERIOD IN 50 RECURRENCES

Period within which recurred (weeks)	*Cases*	*Died*	*Period within which recurred (weeks)*	*Cases*	*Died*
1 ..	4 ..	3	6 ..	4 ..	2
2 ..	9 ..	5	7 ..	3 ..	1
3 ..	12 ..	8	8 ..	0 ..	0
4 ..	7 ..	7	Over 8 ..	7 ..	5
5 ..	4 ..	1			

9. *Results.*—Expectation of life and competence have been noted. In this series of 150 cases 105 either died or were seriously crippled by paralytic sequelæ, incapacitating headache or vertigo. At periods varying between six months and four years 22 cases have been re-examined, and some idea of the end-result may be ascertained from table VII.

TABLE VII—RESULTS TO DATE IN 22 RECOVERED CASES OF SUBARACHNOID HÆMORRHAGE

Case	Interval (months)	Remarks	Present complaint
1	15	Working as school attendance officer.	Sense of lightness in the head only.
2	8	Working in a factory.	Headache on waking, occasional giddiness.
3	12	Working.	Attacks of right frontal headache.
4	12	Three weeks' work only.	Constant pain in head, photophobia, blepharospasm.
5	8	No record of work.	Occasional headaches, poor memory; exophthalmos, no thyroid enlargement.
6	6	Half-time work.	Headache, listless, improving.
7	12	Baker; no loss of time since recovery.	No complaints.
8	18	At former job without loss of time since recovery.	Headache, lassitude; improving.
9	18	Munition worker; no loss of time since recovery.	Pain in back.
10	24	Not worked.	Headache, dizziness.
11	24	Doing important job.	Great improvement.
12	12	Working as messenger.	Right-sided headache.
13	6	No record.	Feels fit.
14	6	No record.	Slight headache.
15	6	[illegible]	[illegible]
16	12	[illegible]	[illegible]
17	18	[illegible]	[illegible]
18	24	[illegible]	[illegible]
19	6	[illegible]	[illegible]
20	6	[illegible] since recovery.	[illegible]
21	48	Working as a barman.	Continuous headache.
22	18	Presumed working.	Very slight headache.

DISCUSSION

The relation of physical strain to subarachnoid bleeding and to rupture of aneurysms of the circle of Willis was the primary object of this investigation. The incapacitated are quick to invoke strain as the fons et origo of many of their ills; and the sight of blood, or knowledge of bleeding, is almost invariably [illegible]

[illegible] are candidates for pension. For the few who do so claim (and in justice to those who do not) we must ask ourselves whether, on the available information, a case has been made for invoking physical strain as the major precipitating factor or indeed as playing any part whatever in determining the onset of subarachnoid hæmorrhage. Are the claims of the furniture-remover and lorry-driver, stricken while carrying out their accustomed tasks for the hundredth time, well founded?

It is desirable to emphasise that only 12 (or 8%) claimed an isolated incident as the precipitating factor, and of these several were very doubtfully deserving of inclusion. In 90% there is no history of physical effort and in 28% there is a special accent on rest, for these were overtaken in bed or chair. It may be argued by those who favour effort as a major factor in ætiology that these figures are unconvincing, that the patient is unconscious, amnesic or of blunted perception and therefore unreliable as a witness, that he may have had a strenuous day before the attack developed and taking to his bed in exhaustion and weariness was there overcome. Or again, that while isolated strain plays little part, continued stress is highly suspect and that the enjoyment of quiet conditions at the time of rupture proves nothing. These points have been most carefully considered and in every case exhaustive inquiry has been made for collateral and corroborative evidence from relatives or associates. In almost every case the result has been a denial of unusual stress. For the contention of continued stress as a determinant, a necessary and inescapable corollary would seem to be a raised blood-pressure. But we find ourselves faced with the disconcerting and embarrassing findings in 63 of these cases in which there are blood-pressure readings. In 52 of these the systolic blood-pressure was found to be under 150 mm. Hg *and that at a time when with a raised intracranial pressure it would be expected to soar.* In only 7 cases was the diastolic blood-pressure over 100 mm. Hg. It seems a safe deduction that, however scanty our knowledge of the causes of rupture or leak, a raised blood-pressure is not one of them.

I suggest that the claim to the precipitating influence of stress and strain is weakened by these findings; but there is, I think, more convincing evidence to present, based on recurrence. Here we have the patient in most instances under conditions of our own choice, subject to more accurate observation and independent of the untutored accounts of lay witnesses no matter how reliable. Of 50 recurrences in this series, more than two-thirds happened while the patient was still in bed or had been allowed up under the quiet and controlled conditions of hospital life. The emphatic testimony against stress and strain in the production of the primary attack seems to be underlined by the observations on recurrences, and it seems logical to propound that if these factors play no part at the end they can also be exonerated at the beginning. Indeed, as between rest and effort this series suggests that the former deserves the greater share of blame.

SUMMARY

In a review of 150 cases of subarachnoid hæmorrhage it was found that the main incidence of aneurysmal rupture fell in early, or early middle, life; no reliable premonitory sign of aneurysm or its rupture could be specified but evidently headache of migrainous type in young people in whom no relevant family history is obtained should arouse suspicion; a concurrent ocular palsy would disperse a deal of doubt and would justify recourse to radiology. But in most cases the clinical picture was presented without warning or ceremony and the subject felled in the full enjoyment of his life.

Headache, sudden, severe and memorable was the introduction in the vast majority of cases and the association of pyrexia, vomiting and neck rigidity are often apt to cause misjudgment in favour of cerebrospinal meningitis. Convulsions were uncommon, and among objective signs papillœdema was unexpectedly rare (7%). Vascular hypertension was a negligible factor and in no case was a positive Wassermann or Kahn test found. It seemed quite clear that physical effort was unimportant in the ætiology.

The various symptoms and combinations of symptoms have been examined for prognostic indication but without any real success.

Autopsy was carried out in 58 cases; in 43 a ruptured aneurysm was found; in the remainder the hæmorrhage was definitely confined to the subarachnoid space but no aneurysm could be detected.

In this series there was a high incidence of aneurysmal dilatation on the right side of the circle of Willis, and on the anterior offshoots.

The gravity of the illness was reflected in the high mortality-rate (56%) and in the poor prospects of a really recovery, which prospects diminished with advancing years. Not many of those examined subsequently were entirely free from symptoms, though these were often not a barrier to employment.

I am indebted to the Director-General of Medical Services, Ministry of Pensions, for his interest in the investigation and for his permission to publish this paper.

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DEPOSITION OF PROTEIN MATERIAL IN IMPLANTED PELLETS OF STEROID HORMONES

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D SC

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Crystalline steroid hormones are now often administered by the subcutaneous implantation of pellets made by compression, according to the technique introduced by us in 1937. Certain local reactions follow the implantation of such foreign bodies. If a pellet is left undisturbed in the subcutaneous tissue for some time it becomes, in most cases, enclosed in a tight connective-tissue capsule which can usually be skinned off cleanly when the tablet is removed. The thickness of this capsule and the regularity with which it is formed vary with the species of animal, the substance implanted, the local conditions, and the duration of implantation. The extent to which the capsule prevents continued absorption is not yet clear: on the one hand, there is good evidence that tablets may be absorbed at a regular rate throughout their life (Thorn et al, 1939); on the other hand, there are reports that capsule formation may bring to an end the absorption of active material while much of the pellet still remains (Walter, Geist and Salmon 1940).

A fresh aspect of this problem was raised by Folley (1942a), who found that tablets of stilbœstrol which had been implanted for an appreciable time acquired, in addition to the connective-tissue capsule, an interstitial deposit of protein matter. This deposit could be demonstrated by removing, cleaning and drying a pellet, and immersing it in ether, whereupon the active substance dissolved and the residue floated to the top of the solution as a semitransparent or opaque body. The fact that the body had shape and coherence suggested that some definite process of deposition was involved, rather than the mere leaving behind of the dry matter of the body fluids which permeate the pellet. Folley reported that the deposit was in the superficial layers of the tablet only, so that after the removal of the stilbœstrol it took the form of a hollow envelope. The original observations related only to stilbœstrol and hexœstrol implanted into heifers, but Folley (private communication) has observed the same phenomenon with œstrone implanted into rats. Folley holds that the interstitial deposit progressively inhibits absorption, since he found that a tablet which has been removed, cleaned and re-implanted is absorbed more slowly on the second occasion (Folley 1942b). It should be emphasised, however, that in Deanesly and Parkes's original experiments pellets of androstanediol were still being actively absorbed after 13 successive implantations, removals and re-implantations, and that Emmens's (1939) very careful investigation of the rate of absorption of tablets of stilbœstrol esters showed that absorption, checked by periodic removal, proceeded steadily for the whole duration of the experiment—300 days.

Compressed tablets will inevitably have interstices capable of being filled with protein, and considerable interest, therefore, attaches to a recently introduced method of making pellets for implantation by fusing the active substance into solid blocks (Shimkin and White 1941). Such blocks should have no interstices and should therefore offer much less opportunity for the deposition of protein matter. Since fused blocks may ultimately succeed compressed tablets for implantation this possibility is of practical as well as of theoretical interest.

We have now examined the behaviour of fused blocks by comparison with that of compressed tablets, and made some further observations on the deposition of protein matter in implanted tablets.

OBSERVATIONS

Comparative absorption of tablets and blocks.—Four substances were used—œstradiol, testosterone, progesterone, and desoxycorticosterone acetate ('DOCA'). Tablets and blocks were made of approximately the same weight (50 mg.), and of as nearly as possible the same shape. In one series of experiments one rat was used for each substance, the tablet being implanted on the left side, and the block on the right. In several cases, after an initial period, usually 30 days, the tablets and blocks were removed, cleaned, dried, weighed and re-implanted into another rat for a further period. The results are shown in the table.

In the experiment with œstradiol, in the first experiment with testosterone, and in the 30-day experiments with progesterone and DOCA, the results with tablets and blocks were virtually identical. The differences between the other figures are not consistent, as they indicate a slightly faster absorption of progesterone in block form, and a faster absorption of testosterone and DOCA in tablet form. It may be provisionally concluded from these experiments that the rate of absorption of fused blocks is of the same order as that of compressed tablets.

Comparative deposition of protein in tablets and blocks.—The residual blocks and tablets from the experiments recorded above, after being cleaned, dried and weighed, were transferred to ether at room temperature, to dissolve away the active substance. As anticipated from the work of Folley, from each tablet a coherent ghostly * residue of the same size and shape as the tablet was left behind in the ether solution. This protein meshwork was particularly dense in the case of the œstradiol tablets. It seems, therefore, that tablets of œstradiol, testosterone, progesterone and desoxycorticosterone acetate must be added to the list of those which acquire an interstitial deposit of protein on implantation. In spite of this confirmatory result with compressed tablets, we were surprised to find that treatment of the fused blocks with ether led to a similar result, though in this case the body left behind after ether extraction was thin-walled and apparently hollow.

COMPARATIVE RATE OF ABSORPTION OF COMPRESSED TABLETS AND FUSED BLOCKS

Substance	Nature of pellet	Duration of implantation (days)	Weight of pellet (mg.)		Absorption %
			Initial	When removed	
Œstradiol ..	Tablet	{30	51	45	12
		{60	51	39	23·5
		60	50	36	28
	Block	{30	50	45	10
		{60	50	37	26
Testosterone ..	Tablet	{30	50	25	50
		{60	50	10	80
		60	51	11	78
	Block	{30	50	25	50
		{60	50	9	82
		60	50	19	62
Progesterone ..	Tablet	{30	50	36	28
		{60	50	28	44
		{15	50	43	14
		{75	50	22	56
	Block	{30	50	34	32
		{60	50	15	70
DOCA ..	Tablet	30	50	42	16
		60	50	21	58
	Block	30	50	40	20
		60	51	38	25·5

The brace indicates two results obtained on the same pellet by removal and re-implantation.

Because of the further work described below it was impracticable to weigh the residual bodies, but it was evident that the deposits in the tablets were much more substantial than those in the blocks.

Histological examination of deposits.—The protein material was [illegible] From ether, the bodies w[illegible]lcohol, enough eosin being [illegible]sibility. They were then cleared in xylol, embedded in paraffin wax, sectioned, stained and mounted in the usual way. The material stained readily with hæmatoxylin, and the fact that it survived the histological treatment outlined above confirms Folley's conclusion that the interstitial deposit is largely protein in nature. On microscopic examination it was found that the residual bodies from the compressed tablets were solid in the sense that the meshwork of protein was continuous right through the tablet, and was remarkably even except for the greater density of the surface layer (fig. 1). The bodies from the fused blocks, on the other hand, consisted only of a thin envelope which appeared to have formed through the deposition of protein in the superficial interstices caused by absorption from the surface of the block (fig. 2). In one tablet of testosterone, where a small amount of the connective tissue capsule had been left on, histological examination showed small trabeculæ of fibrous tissue growing into what had probably been the superficial interstices of the tablet, but the cellular capsule was always quite distinct from the interstitial protein deposit (fig. 3). As histological material these specimens suffered from the facts that (*a*) with one exception, the connective-tissue capsule had been stripped off before the hormonal substance was dissolved away, so that the relation between the connective-tissue capsule and the interstitial meshwork could not be ascertained, and (*b*) the tablets, including their protein constituent, had been air-dried before the histological work was undertaken. We therefore made furth [illegible] histological observations on more adequately f[illegible] material. A tablet of œstradiol trimethyl [illegible] implanted for 150 days, was removed [illegible] connective-tissue capsule and fixed whole [illegible] fluid (60% absolute alcohol, 30% ch[illegible] acetic acid), which was chosen for its [illegible] and [illegible] the œstradiol [illegible]

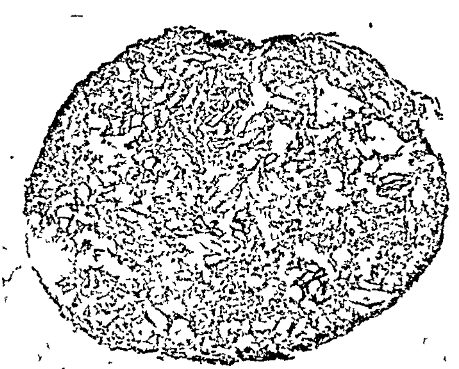

Fig. 1—Section of the protein deposit in a compressed tablet of desoxycorticosterone acetate. The tablet weighed 50 mg. on implantation, and 21 mg when finally removed after 60 days. The deposit extends throughout the tablet. (× 18)

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* Folley used the word "ghosts" to describe the bodies left behind when the active substance is dissolved away, but we hesitate to apply the word to bodies which can be examined by histological methods.

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fixation, the specimen was cleared, embedded and sectioned as usual. On microscopic examination the connective-tissue capsule was seen to be sharply defined and to have no obvious connexion with the interstitial deposit. The latter, in contrast to the capsule, appeared to have no cellular structure, and no evidence was obtained that it had ever included living tissue. This conclusion agrees with the fact that the connective-tissue capsule can be easily and completely stripped off the tablet when it is first removed from the animal so that no organic connexion between the capsule and the material deposited in the interstices of the tablet would be expected.

Deposition of protein in tablets made with excipient and after intraperitoneal implantation.—Experiments had been carried out in another connexion with 50 mg. tablets made of 60% stilbœstrol dipropionate, 39% lactose and 1% stearic acid, from which the lactose is very rapidly absorbed, leaving behind a highly porous mass. Such tablets were found to have a very substantial protein deposit. In a specimen examined microscopically after 20 days implantation, the meshwork was very thick and dense, while in similar ones implanted for 5 and 10 days the dried ether-insoluble material weighed about 2 mg. (7% of the weight of the tablet when removed). The rapidity with which the deposit is formed was also shown by the finding of a well-developed deposit in a 25 mg. stilbœstrol tablet implanted for only 5 days. The connective-tissue capsule takes several weeks to develop, and the presence of coherent deposits after even 5 days shows that the capsule is not necessary for their formation.

This conclusion was confirmed by examination of 25 mg. tablets of stilbœstrol after intraperitoneal implantation. Even after 5 days, when the tablets are still quite free in the peritoneal cavity, a well-developed deposit was found after extracting the tablets with ether. The meshwork may not be complete through the tablet in these early stages, but it is evident that the process of deposition is at work.

DISCUSSION

The weight of the pellet, cleaned and dried after removal from the animal, will include that of the interstitial protein, which according to Folley may amount to 2–3% of the tablet when removed, and the weight of the hormone itself will be correspondingly less than appears by the usual technique of estimation. The difference will be greater with compressed tablets than with fused blocks, and with the former, as Folley pointed out, may appreciably affect the calculation of the absorption-rate if only a small amount of active substance has been removed.

The experiments described show that the rate of absorption from a tablet with a complete protein deposit is roughly the same as that from a fused block in which it is only superficial. It is possible therefore that if both were free from protein a tablet might be absorbed more rapidly than a block, because its porosity would result in a much larger surface being presented for absorption than in the case of a fused block of the same weight.

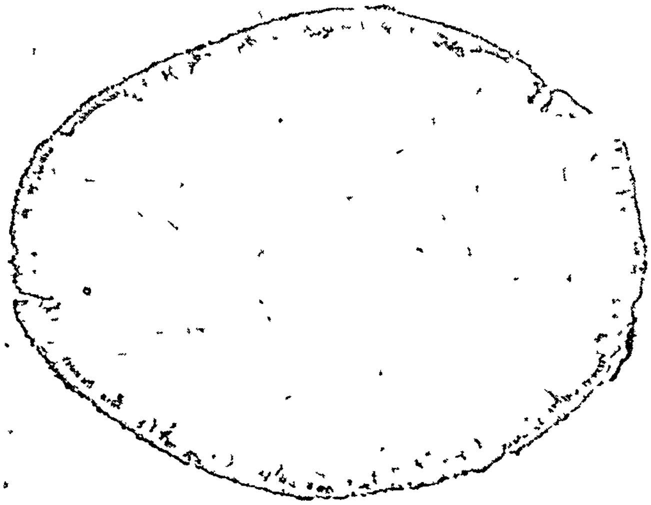

Fig 2—Section of the protein deposit in a fused block of desoxycorticosterone acetate. The block weighed 50 mg. on implantation and 38 mg. when removed after 60 days. The deposit is sparse and restricted to the superficial layer of the block. (× 20)

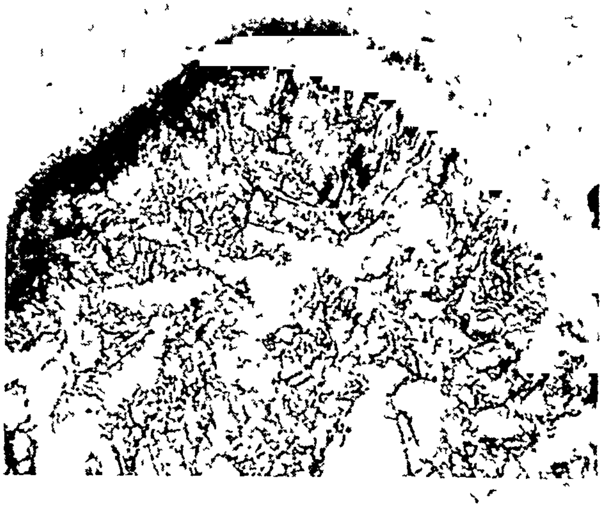

Fig 3—Section of part of the connective-tissue capsule and interstitial deposit in a tablet of testosterone, implanted for 60 days. The capsule, composed of live tissue, is clearly demarcated from the interstitial deposit. (× 200.)

Even if the presence of the protein deposit slows down the absorption of the tablet, and to a lesser degree of the block, the figures given in the table offer no support to the view that the slowing down is progressive and that a pellet is more slowly absorbed in relation to its weight as time goes on. This conclusion is in keeping with evidence adduced above that the formation of the interstitial deposit, as distinct from that of the connective-tissue capsule, results from precipitation of the body fluids which soak into the tablet, rather than from a process of tissue growth, and becomes complete at a very early stage in the life of the tablet.

SUMMARY

In experiments with œstradiol, progesterone, testosterone and desoxycorticosterone acetate it was found that tablets made by compression were absorbed, after subcutaneous implantation, at about the same rate as blocks made by fusion.

Both types of pellet acquired an interstitial deposit of protein material as described for stilbœstrol tablets by Folley, but histological examination showed that, whereas the deposit was continuous throughout the tablet, it was superficial only in the block.

The meshwork showed no signs of having included living tissue or of having histological connexion with the sharply demarcated connective-tissue capsule which forms round implanted pellets.

The formation of the protein deposit is not dependent on the presence of the capsule, as is shown by the fact that it appears within a few days of implantation, before encapsulation takes place.

No evidence was obtained that the interstitial deposit of protein material slows up the absorption of the pellets.

Our thanks are due to Dr. S. J. Folley, with whom we have been able to discuss progress and exchange information during the course of the work.

We are indebted to Organon Laboratories for the fused blocks, and to Boots Pure Drug Co. for the stilbœstrol tablets.

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TRANSFUSION IN THE AMBULANCE

ITS VALUE IN THE WESTERN DESERT

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A WOUNDED man loses blood and blood-plasma at the time of wounding, and this loss may be so severe as to cause circulatory collapse, or "wound shock." But a second and scarcely less important factor with the severely wounded is the further loss of plasma into the … by movement during evacua… …e largely overcome by setting …" in ambulance cars.

In the Western Desert resuscitation work met some special problems. The distances between battlefield and field ambulances or casualty-clearing stations (CCSs) varied from 20 to 120 miles, and the tracks were very bad. They were the shortest route between two points. If the surface of a ploughed field could be hardened into concrete it would offer a fair imitation of long stretches of the main supply routes. Even tracks which had a good surface on the day they were marked out by the grader degenerated to the usual standard during three or four days of army usage.

Most of the battles along the North African coast were fought in areas where the water-supply was restricted to half a gallon per man per day for all purposes. This was sufficient to keep the forward troops in apparent good health, but was not always enough to maintain the water reserve on which the body depends to compensate for blood-loss, especially when the heat of the desert depleted the body fluids through endless perspiration. Wounded soldiers therefore were not so well able to compensate their blood-loss as their fellow casualties in a well-watered country.

Another factor which increased the degree of circulatory collapse was the widespread use of many types of mine and booby-trap by the enemy. These were employed on the most elaborate scale. They produce a unique type of injury in that detonation occurs in contact with the body, and often results in compound injuries of both lower limbs, associated with extensive surface laceration and the blasting open of the muscle layers, with much tissue destruction and hæmorrhage, while buttock and scrotal wounds are common. The resultant circulatory collapse is severe and these cases need considerable quantities of blood and plasma before operation can be undertaken.

TRANSFUSION OF CASUALTIES FROM BATTLES OF MARETH AND ENFIDAVILLE

—	Wounded in one corps area	% transfused	Fluid transfused per 100 casualties (bottles)		
			Blood	Plasma	Total
Mareth, March 16–25	1393	18	46	20	66
Enfidaville, April 20–May 5	820	12	23·5	9	32·5

(a) The unit of fluid in Eighth Army is the Bristol blood bottle, … …tains 100 c.cm. of … …(IV) blood. … …the main dressing-…

Further, wounds in desert warfare seem to be more severe than those received in less bare country. This is probably because of the lack of natural cover available for infantry attacking a defended position. At the Mareth battle, fought over typical desert country, approximately 18% of casualties received a transfusion in the forward areas (in field ambulances, or corps CCSs), whereas at Enfidaville, where the country is hilly and rock-strewn, despite fierce fighting, the proportion of casualities needing transfusion fell to 12%, while the number of bottles of blood and plasma used per 100 wounded fell from 66 to 33 (see table).

TRAVEL AND SHOCK

The transfusion equipment of Eighth Army units provided dry plasma for the regimental medical officer, dry and wet plasma or serum for the advanced dressing-stations, and plasma and blood for the main dressing-stations. Blood for the field ambulances, to which no transfusion unit was attached, was issued from the advanced blood bank, which was a mobile supply unit consisting of one refrigerator truck and one stores truck. Blood was sent out in ice-packed insulated boxes, holding up to 20 bottles each. In these it remained fit for use for a period up to 24 hours. An average of 1050 bottles of whole blood, and an equal amount of plasma, was supplied each month for the nine months September, 1942–May, 1943, to the Eighth Army, and of this a little more than half was used with field ambulances. Thus resuscitation was carried on in the most forward areas on a large scale.

During the summer months of 1942, before Alamein, all casualties passed through a single CCS, and it became clear that although it was possible to overcome a man's wound shock in a field ambulance, no guarantee could be given that circulatory embarrassment would not occur before he arrived at the next medical unit down the line. The following is a typical example:

CASE 1.—Sergeant, aged 25. At 08.30 hrs on July 15, 1942, injured by shell-burst (near miss) sustaining severe compound fracture of left femur, with extensive laceration of soft tissues. 10.15 hrs: admitted to main dressing station of field ambulance; circulatory collapse; pulse very rapid and difficult to feel; sweating and very restless; arms and legs cold. Morphia, gr. ¼, warm tea, and hot-water bottle given; plasma, 3 pints, intravenously. 17.30 hrs: warm; pulse 100, full volume; mouth moist. Leg in Thomas splint; comfortable. Evacuated: journey 25 miles on fair tracks. 23.30 hrs: Admitted CCS. Circulatory collapse; pulse could not be felt; severe pain in leg; great thirst; pale; profuse sweating; limbs and body cold; blood-pressure could not be registered from arm.

In these cases the circulation, though restored for the resting man, had not been able to withstand the extra strain of a 20-mile journey across the desert. It was most distressing, when doing the resuscitation work for the surgical teams, to receive these collapsed patients with penetrating abdominal and other severe wounds. They had already been revived once, but it was necessary to recommence resuscitation with a circulation which never responded a second time so rapidly or so fully as at first.

A month later, when severe casualties were evacuated with transfusion in progress in the ambulance cars, it was possible to take the patients out of the ambulances, confirm the satisfactory condition of the blood-pressure, perhaps start another bottle of blood—and the man was ready for the theatre. The following is a typical example taken from the records of seven such cases treated by the unit:

CASE 2.—Lance-bombardier, aged 21. At 12.00 hrs on Aug. 9, 1942, injured by land-mine; traumatic amputation of *left arm above elbow, with severe blood-loss. 18.00 hrs:* admitted to advanced dressing-station; 2 pints plasma given. 20.00 hrs; evacuated with 3rd pint plasma as travelling transfusion. 22.30 hrs; admitted to main dressing station; condition satisfactory; pulse good, 112. Next day, at 10.30 hrs, condition still satisfactory; pulse 82. Evacuated with plasma transfusion; 28 miles over bad track. 14.00 hrs: admitted CCS, with transfusion. Condition very good; pulse 90; BP 120/70; colour good; thirst slight; warm; stump comfortable; needs sleep. 18.30 hrs: BP 130/80; evacuated to general hospital with travelling transfusion, 1 pint blood; 40 miles' journey, fair road surface. 21.45 hrs: admitted to general hospital; good colour; not sweating; pulse good, 96; BP 125/85.

Three of these cases had two journeys, the first without … …e patient showed circula… …journey, and the second … when the condition on … is quoted as an example:

… At 07.45 hrs on Sept. 20, 1942, his face was severely damaged by a shell-burst, with lacerating injuries of upper lip, nose, and both eyes. 09.45 hrs: admitted to field ambulance; has had much hæmorrhage; pulse poor, 110. 10.00 hrs: serum, 2 pints morphine gr. ¼; breathing without obstruction. 11.30 hrs: condition satisfactory; pulse 90; evacuated. 14.40 hrs: … CCS; pulse 108, weak; hands cold; restless; … BP 80/40; pain marked. 14.50 hrs: … morphine, gr. ¼. 15.15 hrs: blood, … pulse better volume. 16.15 hrs: …

100/60; pulse 90; condition satisfactory. 17.00 hrs: evacuated to maxillofacial unit, with travelling transfusion; 20.45 hrs: admitted MFU; condition good; pulse 86, good volume; no pain; skin slightly moist. No circulatory collapse. Transfusion running well.

Experiments and trials have shown that the evacuation of casualties with transfusions in progress is a reasonable possibility, and greatly reduces circulatory collapse. Other benefits which seemed likely to accrue included the following:

1. A regimental medical officer in the desert could treat a severe or moribund casualty by setting up a plasma transfusion in the ambulance, and evacuate the case immediately with a reasonable expectation of the patient reaching a more extensive resuscitation centre alive.
2. Field ambulances, when ordered to move, or when overcrowded could pass even the worst cases down the line with transfusion in progress.
3. Cases in urgent need of surgery—particularly abdominal and chest wounds, maxillofacial injuries and burns—could be evacuated by forward units to field surgical units without waiting for the full restoration of the circulation which would otherwise have been necessary.

With abdominal wounds the initial shock is often severe, the adverse effect of travel is greater than in any other type of case, and the need for surgery is most urgent. A fact perhaps not widely recognised is that however serious may be the effect of movement before operation, it is much worse in the 6 or 7 postoperative days.

For example, two CCSs during the Mareth battle worked side by side within half a mile of each other, 20 miles behind the line. When the line had moved forward, one CCS was ordered to move, and had to pass on to the other unit the cases which it had been holding. Seven penetrating wounds of the abdomen, all 4–7 days old, were considered to be progressing satisfactorily, and were transferred the distance of half a mile in ambulance cars with the greatest possible care. Four of these patients died within 24 hours.

Recognition of these facts led to a standard technique in the desert, by which almost all abdominal injuries were treated. Wherever possible they were resuscitated with whole blood and operated on in selected forward field ambulances, to which surgical and transfusion units were attached. They were held and nursed in the field ambulance for 6–10 days, and in the event of the unit being ordered to move without being relieved by another unit, a detachment was left to care for them. It was the universal practice to employ continuous gastric suction and intravenous saline during the immediate post-anæsthetic period, and for 4–7 days afterwards. A recent analysis of 1000 casualties shows that the average post-operative consumption of glucose-saline in those abdominal cases surviving operation by more than 24 hours was 17·6 pints from the time of operation to the time when fluids could again be taken by mouth.

Burns cases, of which the proportion in the desert was for various reasons abnormally high, probably come second to abdominal wounds in their poor response to travel. Generous administration of plasma or serum is accepted as beneficial. Whenever possible, this was continued during successive journeys to the forward base in the ambulance cars.

Penetrating chest wounds, though not usually in need of extensive transfusion, also travel very badly, and soon show shock. Travelling transfusions overcome this difficulty and should be used as a routine for such injuries.

Maxillofacial injuries often develop a degree of shock out of all proportion to blood-loss and tissue damage. They require the early attention of a special unit with its trained operating team, special anæsthetics and instruments, and high-grade nursing facilities. The problem is to place them in the hands of this unit at the earliest possible moment, and this can be best achieved by the use of blood-transfusion during evacuation.

TECHNIQUE

In devising technique, the following points have to be considered:

1. Ease and rapidity of employment.
2. Only equipment available in all medical units to be used.
3. Absence of discomfort for the patient.
4. Absence of possible complications.

The following technique applies to the Mark IV, four-berth, K.2 ambulance car, which is the best type in use:

The transfusion is set up in the normal manner in the ward-tent or penthouse, with special attention to certain details.

The splinting of the arm must include a firm bandage across the palm to prevent any possibility of pronation of the forearm, which would lead to flexion at the elbow and displacement of the needle. The needle must be placed truly into the lumen of the vein selected, and then along the vein for half an inch. When the set has started running satisfactorily the needle union and the surrounding skin are "fixed" with a four-inch length of 3-inch 'Elastoplast.' It is rarely necessary to employ a cannula, even in the worst cases of shock, and its use in the desert is discouraged because it is difficult to obtain sterile conditions, and because all possible veins should be left for later intravenous therapy. It is important not to fix the arm in a straight splint, for this gives rise to discomfort owing to hyperextension. It is recommended that a piece of 10 cm. Cramer wire should be bent to an angle of 10° at its mid-point, and enclosed in a plaster-of-paris slab to provide rigidity.

A number of pieces of 4-inch cotton bandage are now attached to the giving set in the following manner. A piece 18 in. long is looped through the wire bottle-suspender and allowed to hang loosely. Three pieces, each 36 in. long, are tied firmly to the neck of the bottle (the lower end) and one piece 30 in. long is tied to the lower end of the drip-counter. The patient's documents are now tied to him, gr. ¼ morphine is administered, and he is carried out to the ambulance with an orderly carrying the bottle. The stretcher is placed on the lower bunk, on the side which permits the patient's transfusion arm to be on the "inboard" side of the stretcher. The orderly carrying the bottle immediately ties the suspender to the forward ventilator in the roof of the ambulance with the 18-inch piece of bandage provided. The three lengths tied to the neck of the bottle are used as stays, two being fixed firmly to the hand-grips just below the roof on the sides of the ambulance, and the third tied tightly to the latch of the door at the forward end of the compartment leading to the driver's cab. The bottle is in this way held rigidly in position, a situation which is found to be much better than any "free" or "elastic" suspension method. The drip-counter must now be fixed, and for this purpose a full two-gallon petrol or water can, such as all ambulances carry, needs to be placed immediately below the set on the floor. The bandage from the drip-counter is tied tightly to the handle of the can, and the set is complete.

A medical orderly travels with the patient, as variations in the roughness of the road or track alter the rate of flow and necessitate adjustment of the drip. If the journey is likely to be a long one, a spare bottle of blood or plasma is sent to enable the transfusion to be continued.

On paper, this method may sound cumbersome and complicated, but in practice any intelligent orderly can be taught to set it up in half an hour. Two transfusions can be set up side by side suspended from the ventilator for two patients in the lower bunks. The technique, with very little modification, has been applied successfully both in ambulance planes and hospital ships. In the course of the ten months from August, 1942, to May, 1943, it is estimated that 200 casualties have been evacuated in this manner. It has been found unnecessary to modify the technique, but a holder has now been devised to take the place of the bandages and petrol tin. The advantages of the original method was that all medical units were equipped to employ it immediately. It has now proved itself sufficiently to justify the provision of a standard holder in all ambulance cars of this type.

RESULTS

No case has been traced in which a patient with a travelling transfusion in progress has arrived at a medical unit in a state of shock. Before the battle of Alamein, when lines of communication were short, it was possible to follow a number of these cases from one medical unit to the next. The blood-pressure was maintained for the whole journey at its initial level, and in 2 cases, the systolic BP had risen by 10 mm. Hg. The failures (where the bottle had emptied before the end of the journey and where the [illegible] have been due to the a[illegible] flow had not been adjusted during the journey.

SUMMARY

1. The average severity of wounds and the degree of wound shock are apt to be unusually great in desert warfare.

2. This view is borne out by figures showing the average amounts of blood and plasma given in two periods of severe fighting, in desert and in hill country.

3. The harmful effect of an ambulance journey on an already embarrassed or recently resuscitated circulation is emphasised.

4. A technique has been elaborated in the Western Desert whereby it has been possible to evacuate 200 casualties by ambulance with a transfusion of blood or plasma in progress.

My thanks are due to Brigadier J. Walker, late DDMS Eighth Army, and to Lieut.-Colonel G. A. H. Buttle, adviser in blood transfusion, MEF, for their constant encouragement in these experiments, and to all transfusion officers in Eighth Army, whose help and suggestions enabled the travelling transfusion to become a reality.

EHRLICH'S MEGALOBLASTS

ASSOCIATED WITH LOW MEAN CORPUSCULAR VOLUME AND RED CELL DIAMETER

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DURING the course of a nutritional anæmia survey in the Bechuanaland Protectorate, Africa, we came across a case of chronic untreated amœbic dysentery in a 9 months' pregnant negress, who had been suffering from persistent diarrhœa for the whole of her pregnancy.

The bone-marrow on examination was found to contain typical Ehrlich's megaloblasts, exactly similar to those in the nutritional macrocytic anæmias of India (Wills 1932) and Macedonia (Fairley et al. 1938, Foy and Kondi 1939) and in untreated cases of pernicious anæmia.

The megaloblasts found in this case are not to be confused with the megaloblasts of the American workers (Sabin 1921, Doan et al. 1925). The cells we describe here are the typical Ehrlich's [illegible] network open nuclei, and [illegible] cytoplasm described by Turnbu[illegible] and Israëls (1939b). They are [illegible] cious anæmia and of the nutritional macrocytic anæmia of India and Macedonia. Our wide experience of these cells, which were first introduced to us by Dr. Lucy Wills, as being similar to her Indian ones, leaves no room for doubt as to their existence in the present case. In addition to these there were also present in the bone-marrow [illegible] ite cells—the typical giant [illegible] of Schulten)—which are also [illegible] icious anæmia and nutritional [illegible] Macedonia (Foy and Kondi [illegible]

an [illegible]
th [illegible] state that whatever deficiency is responsible for abnormal maturation of the red cells also affects white-cell maturation, with [illegible] bizarre forms of [illegible]
These [illegible]
polym[illegible] blood of many, if
not al[illegible]

Gia[illegible] cells are typically 18µ to 32µ in diameter, and contain large U-shaped nuclei, coarsely netted and porous in appearance. There may be chromatin condensation in the nucleus but there is never any pyknosis. The cytoplasm is much more immature than the nucleus, finely or coarsely granular, and weakly basophilic when stained in Leishman and Giemsa and buffered with water at pH 6·8. In our opinion these cells are just as characteristic of the macrocytic anæmias as are the megaloblasts of Ehrlich, and we have found them not only in pernicious anæmia, but also in tropical sprue, and the nutritional macrocytic anæmias reported from Macedonia. It is interesting to note that the deficiency responsible for the production of these abnormal red and white cells affects the two series differently: in the red-cell series resulting in the megaloblast, with mature cytoplasm and immature nucleus; in the white-cell series in the giant *stab*-cell, with immature cytoplasm and a mature nucleus.

The presence of Ehrlich megaloblasts in association with normal mean corpuscular diameters, volumes and thicknesses, raises the question of their ultimate fate.

Bock and Malamos (1939), Jones (1937), Fieschi (1938) and Naegeli (1935) state that in their opinion these megaloblasts are present in the marrow of pernicious anæmia and give rise, after treatment with liver, to the megalocytes found in the peripheral blood. If this view is correct, then the term "megalocytic anæmia" should be used to define large-cell anæmias occurring in conjunction with megaloblasts in the marrow. On the other hand Schulten (1937), Doan (1938), Henning (1936) and Schartum-Hansen (1937) consider that the megaloblasts in the marrow are transformed, after treatment, into normal-size red cells. Israels (1939a) believes that megaloblasts occur in the marrow of all "PA-factor-deficient anæmias" and that all such anæmias are megalocytic, but that not all large-cell anæmias have megaloblasts in the marrow.

The present case seems to indicate that megaloblasts can occur in the marrow without giving rise to a megalocytic anæmia. Precisely how this can happen is not clear. It is possible that we may have caught this case at such an early stage that although megaloblasts were present in the marrow sufficient time had not elapsed for the production of a megalocytic blood-picture, though this view would be difficult to fit in with the low blood-count. Or perhaps the exit of these large cells from the marrow was hindered in some unknown way, analogous to that operating in pernicious anæmia, where leucopenia is associated with a hyperplastic marrow. If, as some claim, marrow megaloblasts are converted after liv[illegible]
cells, then other [illegible]
this maturation o[illegible]
in myxœdema. [illegible]
factor exerts its eff[illegible]
stage, thus preve[illegible]
and pushing the [illegible]
None of these exp[illegible] accounts for the large-cell anæmias which occur in the absence of megaloblasts in the marrow.

The interest of the present case is that megaloblasts and giant *stab*-cells were found in association with a mean corpuscular volume (MCV) of $69\mu^3$, and a mean red-cell diameter of 6·75µ as shown by Price-Jones curve (see figure).

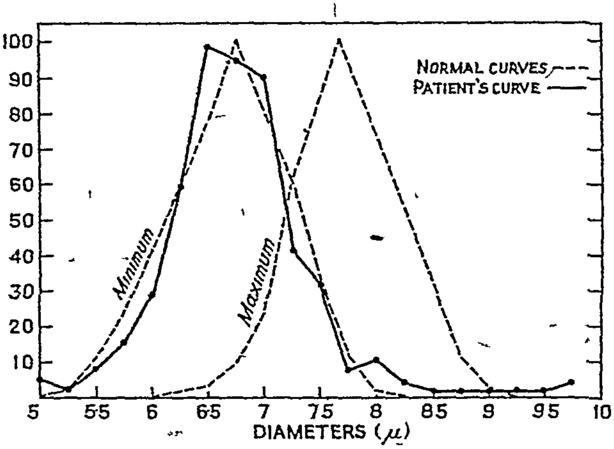
CASE-HISTORY

The woman was brought to us suffer[illegible]
anæmia, and [illegible]
She was ema[illegible]
nant. She h[illegible] and tender liver; spleen not felt. There was no glossitis, though the gums showed the blotchy hæmorrhages common among these natives. Her teeth were very bad, and her gums soggy. Her skin was dry and cheeks sunken. Reflexes were normal; there was no sign of an icteric tinge in the whites of her eyes. There was no history of nose-bleeding or chronic hæmorrhages. Her temperature and pulse-rate were normal. We did a hæmatological examination on May 28, 1942, with the following results: red cells 2,627,000 (± 3%) per c.mm.; Hb. 7%; colour-index 0·92; white cells 3440; hæmatocrit 18%; MCV $69\mu^3$; reticulocytes 0·5%; hæmobilirubin 0·6 mg. %; mean corpuscular average thickness 1·9µ; mean corpuscular Hb. = 26·9γγ; mean [illegible]
A marrow biopsy done at [illegible]
marrow, containing typ[illegible]
stab-cells, and early and [illegible]
parasites were found; t[illegible] any malaria in this area where the spleen rate is about 0·5%. A fæcal examination showed abundant *Amœba histolytica* cysts.

We were unable to follow up the case or to do a gastric test, but have since heard that the woman made an uneventful recovery after having emetine injections, and giving birth to a live child. This history rules out pernicious anæmia.

REVIEW OF METHODS

Our first reaction to the finding of megaloblasts in the marrow. associated with such hæmatological findings, was that our hæmatocrit value had gone astray. We therefore repeated the examination, getting the same results. In addition we carried out an examination using exactly similar methods on a known normal Bechuana native and found the marrow normal in every respect and the blood as follows: red cells 5,700,000 (± 3%)[1]; Hb. 14·5%; CI 1·0; hæmatocrit 46·6%; MCV 80μ^3; MCHb. 25·4$\gamma\gamma$; MCHb. concentration 31·5%; reticulocytes 0·3%; hæmobilirubin 0·4 mg.%.



Price-Jones curve—Arithmetic mean 6·75; standard deviation 0·658; coefficient of variation 9·7%.

The red cells were counted in standardised pipettes and chambers, and a thousand cells counted, thus stabilising the error at ± 3% (Ponder 1934). It will be noticed that the red-cell diameters as ascertained by Price-Jones curve (see figure) were in harmony with the MCV as calculated from the hæmatocrit. The slide for the Price-Jones curve was taken from peripheral blood, and after drying in air was immediately fixed in Leishman for 1 minute, dried and immediately counter-stained in 1% aqueous eosin for 1 minute. This is the standard method used for all our curves, and is the one recommended by Price-Jones (1936). If such methods are always adopted then any change in cell diameters are constant. The hæmoglobin was done by the standard method of Newcomer using a Duboscq colorimeter.

DISCUSSION

This is the first time we have seen Ehrlich's megaloblasts associated with anything but macrocytic anæmias. Other authors have described such cells in cases of chronic diarrhœa and prostatitis; but none so far as we are aware has given the hæmatological findings associated with them. Our case emphasises that one should not rely on a single index in diagnosing macrocytic anæmias. For the diagnosis of such anæmias we regard as essential: a mean corpuscular volume of above 100μ^3 *taken at low reticulocyte level;* a colour-index above 1·0 based on hæmoglobin estimated by some reliable method; the presence of Ehrlich's megaloblasts and *stab*-cells in the bone-marrow; and response to a known potent liver preparation. We have seen many papers describing macrocytic anæmias diagnosed on only one of the above criteria. In particular it is common to find diagnoses made on mean corpuscular volumes alone, with no mention of the percentage of reticulocytosis, which can itself give a macrocytosis. Diagnoses are also quite commonly made on sternal-puncture findings only, the danger of which is illustrated in the present case. The increasing popularity of sternal punctures may lead to confusion among workers not fully aware of the difficulties of identifying megaloblasts, and of the importance of proper staining methods and differentiation: in many parts of the world we have seen diagnoses made on marrow smears in which it was impossible to identify anything with certainty on account of faulty staining. A furth[illegible] which we have constantly met with is [illegible] tiate between early erythroblast [illegible] blasts of Ehrlich—a state worse [illegible] American authors who call erythroblasts megaloblasts, and of some English textbooks on hæmatology, which refer to the hæmocytoblasts of Vaughan, Turnbull, and others, as megaloblasts. Vaughan has given an excellent account of this confusion in her textbook which should be consulted.

It will be noticed from the figure that there is little anisocytosis in the present case, the coefficient of variation being 9·7%. Probably in this case the long-continued diarrhœa, by preventing the absorption of substances necessary for hæmopoiesis, was the factor behind the hæmopoietic failure.

We wish to thank Dr. Bernard Squires of the Bechuanaland Medical Service for putting us into contact with this case; and Miss Hales of the London Missionary Society for her help. Our thanks are also due to the Principal Medical Officer of Bechuanaland.

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POSTERIOR SUBASTRAGALOID ARTHRODESIS IN FRACTURED OS CALCIS

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WING-COMMANDER R.A.F.; REGISTRAR, METROPOLITAN HOSPITAL, AND FRACTURE CLINIC, CHARING CROSS HOSPITAL

FRACTURES of the os calcis now occupy the place once held by adduction fractures of the neck of the femur. Many surgeons have become so dissatisfied with the results of treatment by the recognised methods that they advocate and practise measures which, in effect, consist of ignoring the fracture and treating the patient, and in certain types of these injuries their results are certainly no worse than those produced by treatment in accordance with the accepted principles of reduction followed by immobilisation until firm bony union has occurred.

All types of os calcis fracture are not equally crippling. Generally speaking the ultimate function is much better if the subastragaloid joints are not directly involved in the fracture. When these joints are directly involved it appears to me that any treatment which does not include an immediate arthrodesis of the affected joint is futile. As with any other weight-bearing joint reduction of a fracture involving the articular surface must be absolutely accurate to be effective, and any persisting irregularity will produce subsequent arthritis. The usual methods of traction and lateral compression produce, at best, only an approximately accurate reduction. The articular surface of the os calcis remains irregular, and the articular cartilage of the os calcis and astragalus is contused and crushed. Not only is subsequent arthritis inevitable, but, as joint movement under any circumstances is prevented in the early stages by pain, intra-articular adhesions produced by organising blood-clot become well established. These changes must occur with any form of conservative treatment, although the use of a transfixion pin, with a subsequent low-grade infection of the pin track spreading to the posterior [illegible] dds yet another factor to [illegible] of this joint.

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[1] The altitude of this Native Reserve is about 3500 feet.

Wilson [illegible] tragaloid arthrodesis was [illegible] os calcis in which the subastragaloid joints were involved, and, more recently, Bankart (1942) has advised immediate [illegible]

[illegible] after such injuries, it is also certain that the posterior subastragaloid joint alone bears the brunt of the damage in most fractures. This joint is directly involved in 15% of all fractures of the os calcis, while the anterior subastragaloid joints are only involved in 10% of all [illegible]. It is illogical to [illegible] extending far beyond the limits of the original injury, if as good or better results can be produced by simpler procedures.

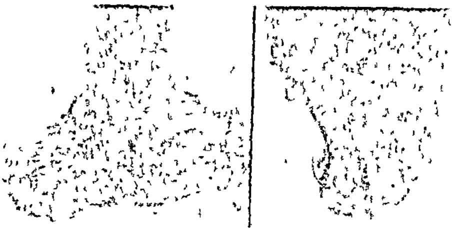
A techn[illegible]rior subastrag[illegible]bell (1930). [illegible] the articular [illegible] and astragalus [illegible] with bone chips from the lateral surface of the os calcis. The method has several disadvantages. The bone available from the os calcis is limited in amount and of a low osteogenic value, and the gap between the os calcis and [illegible] if bony ankylosis [illegible] as Creer (1943) [illegible] etween the astragalus and the os calcis as a whole must be restored to prevent distortion of the midtarsal joint, and this entails complete replacement of the bone removed. Further, after operation on these lines the joint is unstable, and it is difficult to control tilting of the os calcis and prevent recurrence of a valgus deformity of the heel by immobilisation in plaster. This instability also precludes early weight-bearing, which is so important in preventing disuse atrophy and stiffness of the foot, because of pain and the danger of re-displacement in plaster.

[illegible] mbination of [illegible] troduction of [illegible] and joint surfaces much more satisfactory. This operation produces a mechanically stable arthrodesis which is painless, not liable to re-displacement, and permits early weight-bearing. The presence of the graft and the effective immobilisation produced by a combination of internal and external fixation promotes rapid and complete bony union.

TECHNIQUE OF OPERATION

Operation should be carried out as soon as possible after injury, but, because of bruising and swelling, between one and three weeks preliminary treatment is usually necessary.

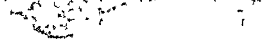
A tourniquet is used and sterile stockingette is applied from the toes to the knee. The posterior subastragaloid joint is exposed by a two-inch incision curving forward from the tip of the external malleolus The peroneal tendons are mobilised, retracted downwards, and the joint capsule is divided in the line of the skin incision. The joint is opened up by tilting the heel medialward, when surprisingly extensive damage to the articular cartilage of both os calcis and astragalus is usually observed. Using a thin chisel the cartilage is completely removed from both bones, together with sufficient bone from the medial half of the joint to correct any valgus deformity of the heel A second short incision is [illegible] scaphoid articular surfaces are defined, and, while the foot is steadied by an assistant who holds the os calcis in normal relationship to the astragalus, two drill holes are made in the centre of the long axis of the neck with a $\frac{3}{16}$ inch drill, which is directed towards the centre of the lower border of the tuberosity of the os calcis. A chisel with a $\frac{3}{4}$ inch blade of uniform thickness is driven through the neck of the astragalus in the same line, joining the drill holes. The chisel crosses the posterior subastragaloid joint, enters the os calcis, crosses the fracture, and is driven home until it approaches the limits of this bone. Its position is then checked by radiography.



4

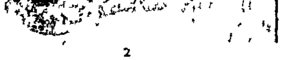
Fracture 9 weeks after operation.

Several points are important during this stage of the operation. The preliminary drill holes which prevent the chisel splitting the neck of the astragalus, should not be omitted, and the scaphoid and tibial articular surfaces must be seen and avoided. Care must be taken to prevent valgus tilting of the os calcis as the chisel is inserted.



1

Chisel in position at operation.



2

Graft in position at operation.

3

Graft cut. Packing of joint completed.

An incision is now made over the subcutaneous surface of the tibia, and a graft the exact width of the chisel blade and about $4\frac{1}{2}$ inches long is cut with a double saw. The loose cancellus bone is removed from the deep surface of the graft, and is packed into the posterior subastragaloid joint around the chisel blade. The graft is smoothed and shaped a little with a file so that it can be driven along the chisel track easily. The chisel is then freed with a few gentle taps with a mallet, withdrawn, and the graft is driven home along its track. After its position has been checked by radiography the protruding portion is cut off flush with the neck of the astragalus and is used to complete the packing of the joint. The incisions are closed, and the leg is immobilised in a well-padded plaster extending from the metatarsal heads to the knee.

Figs. 1 and 2 show the chisel and graft in position in a typical comminuted fracture of the os calcis involving the posterior subastragaloid joint, and fig. 3 shows the position [illegible] completed [illegible] ster with a [illegible] is begun. [illegible] alks with a normal heel and toe gait, and toe and knee exercises are carried out regularly. Weight-bearing in plaster is continued until there is clinical and radiological evidence of firm ankylosis of the joint and union of the fracture. This occurs surprisingly quickly—for example, fig. 4 shows a fracture nine weeks after operation. When ankylosis is firm plaster is discarded and the patient is instructed in exercises to restore full movement to the midtarsal and ankle-joints. At this stage a few weeks treatment at an organised rehabilitation centre, where the necessary exercises and a graded return to full activity can be carried out under expert supervision and in a stimulating environment, is of great benefit to the patient.

This procedure, which in my hands has produced encouraging results, is a logical method of treatment for that 45% of all fractures of the os calcis in which the posterior subastragaloid joint is directly involved. The introduction of a graft immobilises both joint and fracture, bony ankylosis and union are rapid, and the mechanical stability produced makes possible the early weight-bearing which is important in preventing a disuse atrophy of the foot with all its crippling sequelæ. Ankylosis of the posterior subastragaloid joint in neutral position in no way interferes with the efficiency of the foot as a whole, and prevents the occurrence of that potent source of disability, arthritis of a joint through which the whole body-weight is transmitted at every step.

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CONGENITAL CYST OF THE LARYNX

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NON-NEOPLASTIC cysts in the larynx are usually classified into three types: mucous retention cysts; hæmorrhagic cysts; and congenital cysts. Congenital cysts are rare. They may manifest themselves at birth or give rise to no symptoms until adult life, when it becomes difficult to establish their congenital origin. Those which cause symptoms at birth are commonly fatal if not promptly recognised, but cure has been reported by simple aspiration.

Only 15 cases of the condition in infants have been reported since Edis (1876) presented the first and most of these have been identified only at autopsy. Another case is recorded here. Jacobi and Rascoff reviewed the cases published up to 1935 and emphasised that the condition should be borne in mind in the differential diagnosis of laryngeal stridor in infancy. Since then Snaith (1940) has reported a further case.

CASE-HISTORY

A male first child was born of healthy parents on May 20, 1941. The pregnancy was normal; confinement lasted 18 hours and delivery was easy and spontaneous. The child weighed 8 lb. 12 oz. at birth and looked healthy and of normal colour. It did not cry, however, and respirations were slow to start. Gentle artificial respiration was performed and shallow irregular breathing started, but it sounded as if some laryngeal spasm were present. Air was next blown gently into the trachea through a mucus extractor. An injection of adrenaline, and later one of atropine were given and carbon dioxide and oxygen administered at intervals. Respiration remained shallow. About 5 hours after birth considerable cyanosis developed with respiratory distress, particularly severe when the bowels were moving; 12 hours after birth, no improvement being noticed, the child was transferred to the Aberdeen Maternity Hospital at 8.30 PM on May 20. On admission breathing was distressed and oxygen was administered by Gibberd's apparatus. Difficulty in breathing persisted and was often accompanied by cyanosis and stridor. It was aggravated during feeds and resort to catheter feeding was eventually necessary. Extension of the head appeared to give some relief. The child throughout its life made vigorous respiratory efforts and all the accessory muscles of respiration were brought into play. No masses were felt in ck or abdomen. X-ray examination showed no abnormality or tumour masses in the neck. The heart and lungs were clear. On June 14 the temperature rose sharply to 101° F. and next day the child died.

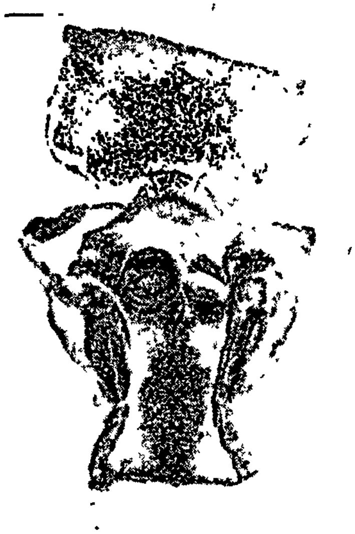

Fig. 1—Larynx opened from behind; cyst in left wall. (x 1·25)

At autopsy the body was that of a well-developed male infant weighing 7 lb. 6 oz. Aeration of the lungs was limited to the anterior and inferior borders, the remainder being atelectatic and somewhat congested; no pneumonic consolidation was present. All the other organs were healthy with the exception of the larynx, the orifice of which was almost completely occluded by a tense semitranslucent hemispherical cystic swelling 5 mm. in diameter, situated on the left wall at the level of the laryngeal ventricle (fig. 1). A horizontal thickened band crossing the lower part of the swelling was believed to represent the true vocal cord. The upper boundary of the cyst was sharply defined. The false cord was arched tightly over the superior margin and was separated from it by a shallow slit representing all that remained of the ventricle of the larynx (fig. 2). The right side of the larynx showed no abnormality. Coronal section demonstrated an extension of the cyst forward along the posteromedial surface of the thyroid cartilage. The contents of the cavity were mucoid. No communication was demonstrated at any point between the lumen of the cyst and that of the larynx. No other congenital abnormalities were present.

Histology.—Half the larynx, including the cyst, was cut in interrupted serial sections. The cyst and the fissure immediately below the false cord were found to be lined by ciliated columnar epithelium, and there was no aperture between them. The wall of the cyst was composed of dense laminated acellular fibrous tissue with the addition of a small bundle of muscle-fibres, cut transversely, at the site of the true vocal cord. In the wall of the forward extension of the cyst there were a few compressed mucous glands. No recognisable inflammatory changes were present in relation to the cyst and no lymphoid tissue was present in its walls.

DISCUSSION

Congenital cysts of the larynx manifesting themselves in infancy have been described in various situations:—in the laryngeal ventricle; on the epiglottis; in the aryteno-epiglottic fold; and in the pyriform fossa. The earlier writers made no attempt to explain their ætiology, but German cases reported by Salomon (1910), Schneider (1912), Pünder (1918) and Stoerck (1916) help to throw some light on the condition. In all these cases the cysts bore a close relation to the laryngeal ventricle and were lined by columnar ciliated epithelium; some contained a nodule of cartilage in the wall. Schneider, who made serial sections of Salomon's case, concluded that the cysts arose by a snaring off of a group of cells which should normally have taken part in the formation of the ventricle but which grew independently and formed a cyst (after the manner of inclusion epidermoid cysts of the skin). Stoerck admits this as one possibility but not as the only explanation. The presence of the nodule of cartilage in the wall of the cyst led him to believe that the cyst might have arisen as the result of differential growth of a group of multipotent cells; in other words that it might be a teratomatous formation. A branchiogenic origin was upheld by Louys (1899), describing an adult case. Jacobi and Rascoff (1935) also considered that one of their cases was of branchiogenic origin in the location of the second cleft. Snaith (1940) interpreted his case as a simple mucus retention cyst.

The difference in situation of the cysts must be considered in interpreting their mode of origin, and it is likely that they are not all of the same nature. In the case of cysts of the laryngeal ventricle, however, which is the only type I have encountered, it seems probable that the ætiology can be explained simply by reference to the development of the larynx as described by Keibel [illegible]

with the lumen of the larynx by a solid epithelial cord. The lumina of the vesicle and the larynx are later joined by hollowing of this cord. If this hollowing process were incomplete the vesicle would remain unconnected with the larynx and could by progressive growth give rise to a cyst lined by ciliated columnar epithelium. By accumulation of secretion ar[illegible] cyst would protrude intc [illegible] the cyst as the result of [illegible] the laryngeal ventricle, and thus as an example of a process commonly encountered as a cause of congenital abnormalities. Such a process is met with in atresia of the œsophagus, of the duodenum, and of the bile-ducts.

The conditions from [illegible] larynx in infancy have to [illegible] laryngeal stridor, extral[illegible] enlarged thymus, and cerebral hæmorrhage. The presence of a cyst rather than a cerebral hæmorrhage is indicated by the vigorous respiratory efforts made by the child to overcome the dyspnœa, and by the presence of stridor. X-ray examination may help in detecting extra-laryngeal conditions. A cyst can be distinguished from con[illegible]

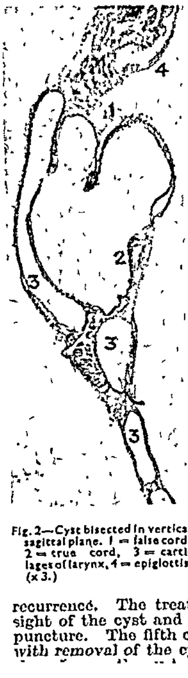

Fig. 2—Cyst bisected in vertical sagittal plane. 1 = false cord, 2 = true cord, 3 = cartilages of larynx, 4 = epiglottis. (× 3.)

symptoms are aggravated by feeding, defæcation, and any action in which the glottis is closed. Some relief is obtained if the head is held extended or turned to one side and the child will possibly find this position for itself. All the accessory muscles of respiration are brought into play to try and overcome the obstruction to breathing. At any time suffocation may ensue. If the condition is borne in mind laryngoscopy will usually reveal the cyst, and Pünder (1918) considers that digital palpation would be very valuable. She maintains that if this had been [illegible]

[illegible] analysis of 13 cases published before their own 2, found that 8 cases died as a result of the cyst. None of these was treated [illegible]

recurrence. The treatme[illegible] sight of the cyst and co[illegible] puncture. The fifth case had a tracheotomy performed with removal of the cyst later by resection. In one of [illegible] 48 hours later and the child [illegible] tion of life in the untreated [illegible] to 10 weeks. Snaith has [illegible] within a few hours of birth. Death in most cases was due to asphyxia or exhaustion.

Thus if the condition is borne in mind in cases of respiratory distress it is not difficult to diagnose and is amenable to treatment. Simple puncture of the cyst is often completely successful. If the child's condition is very poor tracheotomy may be done and the cyst removed when the general condition has improved. If undiagnosed the condition is uniformly fatal in the newborn, after a longer or shorter interval.

SUMMARY

A case of congenital cyst of the larynx is reported. [illegible] is suggested [illegible] ventricle. [illegible] be borne in mind as a preventable cause of neonat[illegible] death.

Diagnosis can be made by laryngoscopy or by palpat[illegible]

Treatment is by resection or simple puncture of the cyst; preliminary tracheotomy may be needed.

I wish to thank Dr. H. G. McPherson for information [illegible] the child before admission to hospital, Prof. Dugald Baird [illegible] access to case-records, Dr. J. Craig for the clinical history, [illegible] Mr. W. A. Nelson for the photographs.

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[illegible]

OXFORD VAPORISER FOR ENDOTRACHEAL ANÆSTHESIA

M. A. RUSHTON, MB CAMB, LDS
CAPTAIN RAMC; ANÆSTHETIST TO A MAXILLOFACIAL UNIT

I USED the Oxford vaporiser[1] for anæsthesia in the operative treatment of maxillofacial injuries sustained in the Tunisia fighting by the Eighth Army. Owing to the length of the lines [illegible] culties nitrous oxi[illegible] was found a very [illegible]

This report is based on the first 120 cases in which the vaporiser was used for endotracheal anæsthesia in this maxillofacial unit. I have divided the cases into two groups: in 60 cases 'Pentothal' was not used during induction; and in 60 cases it was used.

Among those in which pentothal was not used the average duration of each case was 70 min, and the [illegible]

vomiting, or of chest complications, and no deaths.

Among those in which pentothal was used the average duration of each case was 70 min. and the average consumption per case was: penthothal 0·25 g., chloroform 0·25 fl. oz. and ether 4 fl. oz. There was slight post-operative vomiting in 3 cases (5%); again there were no severe vomiting, no chest complications, and no deaths.

TECHNIQUE

Whenever possible, patients were starved for at least 6 hours before operation. One hour before, they received a hypodermic injection of morphine with either atropine or hyoscine. Hyoscine is considered preferable to atropine because induction is quieter and there is often an agreeable amnesia.

Several forms of induction were tried.

Induction with ether using the Oxford vaporiser was slow and unpleasant to the patient. Pentothal followed by ether using the Oxford vaporiser was not unpleasant, and was used where chloroform was contra-indicated because adrenaline was being used during the operation; induction was speeded up by introducing a little carbon dioxide (5%) in oxygen into the vaporiser. Chloroform and ether mixture (C_2E_3) was satisfactory but was still sometimes followed by post-operative vomiting, though not so commonly as pentothal and ether. Ethyl chloride permitted very early blind intubation, but was followed by a relatively high incidence of post-operative vomiting.

The method of choice, and that which was eventually used in most cases, was the initial rapid intravenous injection of 0·25 g. of pentothal, followed by chloroform and ether mixture on the open mask. The dose of pentothal used was small in order to prevent undue depression of respiration with consequent delay in induction. This method, besides being reasonably rapid, was pleasant for the patients and permitted them to face the subsequent anæsthetics, so common in maxillofacial work, with equanimity. Moreover the incidence of postoperative vomiting was greatly reduced.

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[1] Macintosh, R. R. and Mendelssohn, K. *Lancet*, 1941, ii, 61.

As soon as the patient had been intubated he was connected up with the vaporiser, and anæsthesia was deepened until the jaw was sufficiently relaxed for the throat to be packed. A few minutes with a setting of 15% ether concentration was usually found to be sufficient. Most maxillofacial cases are of relatively long duration but do not require very deep anæsthesia and settings of between 5% and 10% ether concentration could often be maintained for long periods. In any case of long duration a small flow of oxygen was fed to the machine as a routine. Wherever there was any sign of operative shock, one pint of 5% glucose saline with 10 units of insulin was given intravenously.

I attribute the absence of chest complications to two factors:—

(a) The incidence of chest complications in maxillofacial work is always low because there is no interference with respiratory function.

(b) The ether vapour inhaled was of constant strength, thanks to the use of the Oxford vaporiser, and too strong a vapour was not given at any time.

CONCLUSION

The two great advantages of the Oxford vaporiser over the simple "tin-can" vaporiser are that the strength of ether vapour is a known constant and can be varied as the occasion demands; and the expiratory valve eliminates rebreathing, thus abolishing the dead space, and helping to keep the inspired ether concentration constant. A quiet anæsthesia results.

The advantages usually claimed for gas, oxygen and ether combination over plain ether are a rapid, not unpleasant induction and a low incidence of postoperative complications, as well as a more comfortable recovery period. The pentothal-chloroform-ether sequence provides an ideal induction. With this method of induction, and the use of the Oxford vaporiser the incidence of postoperative complications has been no higher (in this type of work) with ether than with the gas-oxygen-ether combination, though admittedly the recovery period has in some cases been less agreeable. Finally the far greater portability of the Oxford vaporiser, compared with the field Boyle with its heavy cylinders, makes it, in my estimation, the best means of providing anæsthesia for this type of work in the field.

Reviews of Books

Medical Annual, 1943

(61st year). Editors: Sir HENRY TIDY, DM OXFD, FRCP; A. RENDLE SHORT, MD LOND, FRCS. (Wright. Pp. 432. 25*s.*)

THIS hardy annual is an old friend whose individuality places it in a category by itself. The contributors are not only outstanding, but can present intricate subjects in a manner intelligible to the general practitioner. Few advances of note are overlooked, and a sense of proportion makes the book particularly valuable to those who have neither time nor opportunity to study original papers as they appear. Camaraderie between editors and contributors must be of the right stuff, judging by the frank way the editors interpolate their comments: for example, "This has never been observed in females. (This is incorrect. I have seen a case in an adult woman.—Ed.)." Again, many of the articles are refreshingly discriminating. Macdonald Critchley pours a salutary douche of cold water on the uncritical enthusiasm with which electroconvulsive therapy is being used; and Symonds's survey of sciatica is a masterpiece of impartial summing up. In contrast, the article on diabetes mellitus is somewhat confusing. A lapse in balance is the unnecessary amount of space given to yellow fever and to spontaneous hypoglycæmia. Mr. Harcourt Kitchin ably reviews all the noteworthy legal decisions of the year which have interest for the medical profession.

Social Therapy

M. B. HALE, London Charity Organisation Staff 1935–39; S. M. HALE, psychiatric social worker for the organisation 1933–38. (Williams and Norgate. Pp. 96. 5*s.*)

Mr. and Mrs. Hale describe their book as "material for discussion to first-year students at the Schools of Social Science, officials of the Assistance Board and other statutory institutions, helpers in voluntary organisations and others." It forms a good groundwork for this purpose, stimulating to individual opinion. Social workers in this country are badly in need of textbooks other than those of American origin and this little book, by workers of practical experience, is sound in principle, offers a good framework of information, and is readable besides. Defining case-work as "the art of making sympathetic contact with the client, then of interpreting his difficulties to himself in relation to the other members of his family, to his immediate circle, and to society," the writers give a clear conception of their own ideals and follow it up with practical guidance as to how to achieve them. Writing on the keeping of records they mention that it is essential to keep a copy of all letters sent, and add: "unfortunately it is necessary to emphasise the importance of keeping a *legible* copy." Those who have to struggle with their predecessors' handwritten flimsies will heartily endorse this practical advice.

A Practice of Orthopædic Surgery

(2nd ed.) T. P. MCMURRAY, M CH, FRCSE. (E. Arnold Pp. 423. 30*s.*)

A SECOND edition of this book is well justified by its popularity with the student. It sets out to give a description of the basic principles underlying orthopædic surgery, without overburdening the text with details of operative procedure. The diseases of bones and joints and other lesions of the locomotor system are clearly and succinctly described, and such operations as have proved their worth briefly indicated. The more important conditions are illustrated with photographs, diagrams and X-ray pictures. Fractures are not included, as the author rightly feels they deserve a book to themselves. This book is easy to read and to handle, and is of a comfortable size. It can be recommended with enthusiasm.

Medical Aspects of Aviation

Speed and Acceleration. Captain ERNST JOKL, MD. (Pitman. Pp. 104. 10*s.* 6*d.*)

THERE is a pleasant lack of pomposity about this informal and informative little book which every practitioner, in or out of the Services, will enjoy reading. It explores the body's resistance to a hitherto unfamiliar kind of mechanical strain in a way too interesting to miss. Dr. Jokl's scientific omissions are skilfully managed so as to make the reader feel that he knows a great deal more than he actually—or perhaps really—does, and the numerous illustrations by E. Ullman, art editor of the Johannesburg *Forum*, are drawn with wit and insight.

Anatomy of the Female Pelvis

Including a description of the placenta and its formation and the fœtal circulation. C. F. V. SMOUT, MB BIRM., senior lecturer and acting professor, department of anatomy, University of Birmingham. (Arnold. Pp. 185. 35*s.*)

TEACHERS and students of obstetrics and gynæcology have long waited for a book of this calibre. The anatomy and physiology of the female genital tract is presented lucidly and instructively, with explanations, based on anatomical, physiological and embryological principles, of those clinical phenomena which puzzle students. Ovarian endocrine function, for example, is discussed in such a way that the student can easily grasp the essentials of this intricate and confusing subject. The many microphotographs and coloured illustrations are remarkable findings in a book in the fourth year of war.

ROYAL EYE HOSPITAL CLINICAL SOCIETY.—A meeting will be held at the hospital on Friday, Nov. 5, at 4.30 PM, when Mr. Harvey Jackson will speak on orbital tumours.

THE LANCET

LONDON: SATURDAY, OCTOBER 23, 1943

THE PATIENT'S WORK

WAR has emphasised the connexion between work and health: not only do the circumstances of work influence personal well-being, but industrial efficiency [illegible] increased by the health and happiness of the workers. A health policy should *therefore include the closer* link[illegible]vices with the machinery for [illegible]cal health. There has been too much tendency to regard industrial medicine as a thing apart, and the profession as a whole must take more cognisance of the work of patients and its health significance. RAMAZZINI,[1] the father of industrial medicine, wrote that to the Hippocratic formula for the investigation of sickness he "presumed to add one interrogation more—'namely, what Trade he is of'" and he went on to counsel, doubtless without malice [illegible] when a Physician therefore is call'd to visit one of the poorer and meaner sort of People I would advise him not clap his hand to the Pulse as soon as he comes into the Room, without inquiring into the circumstances of the Patient, nor stand, as 'twere in a transient Posture, to Prescribe where the Life of Man is concern'd; but to sit down by the Patient, let the Place be never so sorry, and carefully interrogate him upon such things, as both the Precepts of our Art, and the Offices of Piety require us to know." He was perhaps influenced by the teaching of PLATO[2] who drew a sharp distinction in *The Laws* between the two types of doctors, one practising upon freemen (he "carries his enquiries far back") the other upon slaves—waiting for them in the dispensaries, never talking to them individually or letting them talk about their own individual complaints. "The slave doctor prescribes what mere experience suggests, as if he had exact knowledge; and when he has given his orders, like a despot, he rushes off with equal assurance to some other servant who is ill; and so relieves the master of the house of his invalid slaves."

We have made some progress since PLATO and RAMAZZINI and now recognise that reaction to work is not confined to one stratum of society, and that unemployment may hav[illegible] results just as disastrous as work that is too exacting. Lately there have been complaints that [illegible] rejects from the Services have been directed into [illegible] work incompatible with their disabilities, and at the end of the war there will undoubtedly be an urge to get away from everything that savours of regimentation; but it is certain that not enough care has been given in the past to helping people, and especially young people, to take up work suited to their aptitudes and capabilities. This becomes still more obvious in the presence of disability or threatened breakdown in health. In Scotland[3] it was found in the Clyde Basin experiment that some 6% of the young persons referred for examination by their own doctors required change of employment if their health was not to be seriously undermined. An earlier experiment to determine what could be done to minimise the increasing volume of long-continued incapacity for work disclosed that of people who had been incapacitated by sickness for as long as three months about 8% needed ch[illegible] if they were to have real hope o[illegible] capacity. Follow-up of a ser[illegible] of the Services showed that change from prewar employment had been recommended for no less than 36%. Admittedly this last figure is swollen to some extent by the circumstances of war and the resultant disorganisation of industry, but the fact remains that there are many cases in which work review is an essential complement to medical care. This implies, as has been suggested, guidance in the selection of suitable work, supervision of working environment and of hours of work—in fact a more physiological approach to the question of employment than has generally prevailed in the past; for it is perhaps fair comment that, despite the excellent work of the Industrial Health Research Board, the approach to industrial health has been too much that of the pathologist: after all, industrial toxicology is but a part, and in the presence of effective supervision of working conditions, not a large part, of the tale of industrial ill health. Since the outbreak of war considerable progress has been made in the appointment of industrial medical officers, and the usefulness of these doctors would be enhanced if the basis of their appointment was satisfactory; which it is not; for a man employed and paid by an industrial organisation cannot hope to enjoy that freedom of action which is essential if he is to achieve the best results. There ought to be closer relationship between the family doctor and the industrial medical officer. Pari passu with improvement in working environment and conditions of service, there is urgent need for the development of facilities which can best be provided as general health measures. These facilities include vocational guidance, consultant help in the prevention of impending health breakdown, advice on the work problems of men with established disease still capable of employment suited to their residual disability, and a rehabilitation service designed to restore the sick and injured as fully as is possible. The provision of such facilities, and encouragement of the family doctor to use them freely, could not fail to promote alike personal health and industrial efficiency.

The report[3] prepared by the medical staff of the Department of Health for Scotland gives a short account of experiments recently undertaken in this important field of social medicine. The results of these experiments, like the findings of the Industrial Health Research Board, must inevitably shape policy.

THE MENOPAUSE AND AFTER

MR. ERNEST BEVIN answered those who have protested against the call up of older women by pointing out that he had registered nurses and midwives up to sixty without exciting a single comment. The anxiety which the suggestion has aroused do[illegible] come from the women themselves, and is not [illegible] of women who have worked all their li[illegible] behalf of those home-keeping wom[illegible] come, in the minds of their hu[illegible] possibly in their own minds [illegible] it would be useful to consider the position of these women and to discover if possible whether the call up offers them a worse or a better prospect for health than that they would normally face. First, there is no evidence that women who work outside their homes for a living during the menopausal years have worse health than those who are home-keeping; an investigation made some years ago[1] into the menstrual history of a thousand women, especially in relation to the menopause, showed that health and—as far as could be judged—efficiency were only occasionally impaired. Very few had to reduce their work or give it up, or to take more than their usual annual holiday. By far the greater number of women suffer only from moderate discomfort during the change of life, and those who are actively employed seem to suffer less than those who are able to take things easily and give their symptoms full attention.

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[1] Ramazzini. A Treatise of the Diseases of Tradesmen. English [illegible]

[2] [illegible] The Laws. Sir Richard Living[illegible]

[3] [illegible] Dept. of Health for Scotland. [illegible]ice, 1943. See also p. 519.

Neurotic manifestations often ascribed to the climacteric are found in women with a previous history of emotional and nervous instability—very rarely in those who have always been stable and well adjusted. In the forties women reach the break between youth and middle age, and for many of them this entails a painful mental and emotional readjustment. The home-keeping woman whose children are growing up is particularly hardly placed. Husbands and wives are apt to lose touch a little between the thirties and forties, and adolescent children are naturally averse from spending much time at home with their mother; they have important adjustments of their own to make. The prospect for the menopausal woman in these circumstances is rather bleak, and the temptation to magnify trivial symptoms into weapons to retain love (or the observances of love) is considerable. Moreover, her emotional disturbance has repercussions on her physical state; she is fair prey for a psychosomatic illness. At first sight it might be supposed that a woman in this disgruntled state would hardly be a useful candidate for a job. In practice the reverse is true: the job, by making her once more responsible and valued replaces some of the stimuli now missing from her home life; and since fatigue is more commonly a symptom of boredom and dissatisfaction than of overwork she usually feels less tired than she did before. The working-class woman at this time of life is less exposed to her feelings; she may seek prompt treatment for any physical disabilities which crop up, but otherwise she carries on as usual. Some working women, not only at this time but at other periods of life as well, really are suffering from the effects of overwork; but this is because they actually have too much to do—a separate issue from their capacity to do it.

The menopausal years vary considerably in different women; for many the menopause begins at 40, for some it is delayed until after 50. Miss RATHBONE'S remark that the period of 50–65 is often the healthiest in a woman's life is fully endorsed by experience. At this time women have good physique, and the emotions and anxieties of rearing their children and maintaining family life are behind them. If they have had any form of training in earlier life it adds to their capacity at this age, and they usually take kindly to a job provided there is some elasticity in the pace and hours of work. They have shown themselves to be adaptable, and readily develop skilled movements and understanding of their task once their confidence is established.

SPONTANEOUS SUBARACHNOID HÆMORRHAGE

IT was the work of TURNBULL[1] and FEARNSIDES[2] that first aroused interest in intracranial aneurysms as a cause of spontaneous subarachnoid hæmorrhage. On our opening page Dr. MAGEE brings the story up to date and adds his own extensive observations which have the special interest that his material was drawn mainly from the Forces and Civil Defence Services. His patients, for the most part between 20 and 50 and presumably mostly male, belong to a group in which subarachnoid hæmorrhage is not very common, and although the disorder is in general commoner among women than men the incidence in women in this particular group seems to have been low.

The *fatality of subarachnoid hæmorrhage is high*, 56% in MAGEE'S series of 150, and 63% in TAYLOR and WHITFIELD'S[3] series of 81 cases. About a third of MAGEE'S patients died in the first attack, and more than half the survivors had a second attack which proved fatal in two-thirds of the cases. A second hæmorrhage is thus twice as likely to be fatal as a first. These figures lend strong support to JEFFERSON'S[4] recommendation of treatment by carotid ligature when the aneurysm has been localised by angiography. This, of course, applies especially to those aneurysms which give rise to focal signs enabling diagnosis before rupture. MAGEE'S observation that in most cases effort plays no part in precipitating a hæmorrhage is clearly of importance in relation to claims for compensation and for service pensions. The qualification "in most cases" is necessary, for it is within the experience of clinicians that occasionally the hæmorrhage occurs during violent physical exertion, as for example in a man who fell unconscious while pulling in a tug of war; it would certainly be difficult to persuade a court that a man whose hæmorrhage took place while he was lifting a heavy sack had not sustained an accident "arising out of or in the course of his employment."

BALLANTYNE[5] has recently studied the way in which subarachnoid hæmorrhage causes ocular symptoms. The earliest explanation of intra-ocular hæmorrhage after subarachnoid hæmorrhage was that blood was forced from the optic nerve sheath through the lamina cribosa into the eye. This hypothesis was disproved and replaced by the suggestion that blood driven into the subarachnoid space of the optic nerve sheath compressed the ophthalmic vein and caused hæmorrhages from its tributaries. BALLANTYNE shows that hæmorrhages occur in the orbit which cannot be caused in this way and produces evidence that such multiple hæmorrhages can be explained by the sudden rise of intracranial pressure causing a stasis in all the venous channels which drain the tissues of the eye and the contents of the orbit. He makes the suggestion that the same mechanism may cause hæmorrhages into the substance of the and that some of the clinical signs of subarachnoid [illegible] paresis and disturb- [illegible] the eyes, may be due

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[1] *Lancet*, 1933, i, 106.

[1] Turnbull, H. M. *Quart. J. Med.* 1915, 8, 201.
[2] Fearnsides, E. G. *Brain*, 1916, 39, 224.
[3] Taylor, B. and Whitfield, A. G. W. *Quart. J. Med.* 1936, 5, 461.
[4] Jefferson, G. *Brain*, 1937, 60, 444.
[5] Ballantyne, A. J. *Brit. J. Ophthal.* 1943, 27, 383.

HARD HEADS AND HARD LABOUR

SOME expectant mothers are refusing to take their cod-liver oil and even their extra milk for fear of having large babies and long labours. This idea no doubt arose from an isolated case or two of long labour in women who had conscientiously taken advantage of the Government's wise provision for their wellbeing, and it will be a great pity if it is allowed to spread. For there is no doubt that a generous supply of calcium and vitamin D is essential for the proper calcification of fœtal bones and teeth; long ago MELLANBY [1] pointed out that a deficiency of vitamin D in the maternal diet results in a lowered vitality of the offspring after birth and a predisposition to rickets. A small investigation in America can be cited as grounds for the fear that dietetic supplements may prolong labour. FINOLA, TRUMP and GRIMSON [2] gave 33 expectant mothers 250 units of vitamin D and dicalcium phosphate equivalent to 1·44 g. of calcium and 1·08 g. of phosphorus daily; 25 other women acted as controls, receiving no supplement. The average birth-weight of the infants was 1 oz. less in the treated than in the control group, but labour in the treated lasted on an average an hour longer than in the controls. The total serum calcium and inorganic phosphorus of the newborn was higher in the treated group, and radiograms of the ribs, parietal bones and epiphyses at the knee showed an increased bone density in most of these infants compared with the controls. FINOLA and his colleagues suggest that the extra density of the parietal bones might interfere with moulding of the head in borderline cases of disproportion. But a nation-wide radiological investigation would be needed before the effect of vitamin D on the fœtal skeleton could be properly evaluated, and that is out of the question at present.

An inquiry which must carry weight is that of the People's League of Health,[3] which was directed from the outset by statisticians of high repute. In this research 5000 expectant mothers living in London were divided into two equal groups. The treated were given, among other supplements, min. 6 of halibut oil daily, containing about 19,000 IU of vitamin A and 900 IU of vitamin D, from before the 24th week of pregnancy until delivery. Regarding birth-weight, there was a difference of 0·18 lb., which approached significance, in favour of the treated primigravidæ aged 30 and over; there was no significant difference in the other age-groups. With multiparæ of all ages the difference between the birth-weights was 0·07 ± 0·05 lb. in favour of the treated, hich was not significant, but in 3 out of 4 age-groups babies of the treated mothers were slightly avier. But—and this is the main point from the pectant mothers' point of view—there was no idence that vitamin and mineral additions to the etary influenced either the severity or duration of bour.

Mellanby, E. *Brit. med. J.* 1926, i, 515.
Finola, G. C., Trump, R. A. and Grimson, M. *Amer. J. Obstet. Gynec.* 1937, 34, 955.
Lancet, 1942, ii, 10.

Annotations

WHICH ARE THE "TEACHING SCHOOLS"?

THE five or six years which precede the taking of a *degree or diploma are largely spent in factual instruction.* The subjects of the curriculum can be, and sometimes are, the medium of "education"; but even when it is there, the intention is often frustrated by the limitation of time imposed upon each [illegible] many claims upon receptivit[illegible] upon competition. In the [illegible] cation comes the opportunity for the education that turns a boy into a man. It is then that the senior who recognises his duties as well as his rights can "teach" in freedom. If the senior is a professor with a team of experts in education, perhaps his house-physicians and house-surgeons go to the best school; but the great majority of young men and women go to other masters, and hospitals other than those with medical schools.

It is remarkable that neither the universities nor the Royal Colleges have openly and specifically recognised the educational responsibilities accepted and discharged by the staffs of voluntary and local-authority hospitals throughout the country. In the same way, for the best part of a century the value of the services of all those engaged in preclinical instruction were also greatly underestimated or altogether unrealised. But latterly there have been *great changes, and if, in the near future,* the subsidy to medical education is to be substantially increased, the question may well be asked "who are the teachers and which are the teaching hospitals"? Is it not open to the staffs of the non-teaching voluntary hospitals and of the great municipal and county general hospitals to say to the universities, "We are doing a considerable part of your work; with us men train for their higher degrees; we are, in fact, a part of your staff." To such a claim a university might reply, "Who are you? Who appointed you? Upon what qualifications? Upon what academic attainments? What are the resources you draw upon in performing these educational duties?" Is it to be presumed that the hospitals would shrink from such inquiries? and if they did, to what category of inferiority would they consign themselves? [illegible] in its most compre[illegible] would it strive to [illegible] to secure the hallmark which advertises to every patient entering its walls that "here you will be cared for by men who know their job and have at their disposal all that is needed for their best work."

It would be something gained if the teaching activities of hospital clinicians all over the country were recognised, *and perhaps remunerated*: that would be good for the doctors. It would be immeasurably more important for the patients—and that is for the whole community—that the standard of work, its organisation and its equipment, would come under the watchful eye of an impartial judge of standards.

THE PSYCHIATRIST AND THE CRIMINAL

Dr. W. Norwood East, in his presidential address to the section of psychiatry of the Royal Society of Medicine on Oct. 12, nicely illustrated the maxim:

> Be not the first by whom the new are tried
> Nor yet the last to lay the old aside.

Criminal responsibility, he feels, is a legal concept which the public understands and approves; and as yet psychiatry has no satisfactory substitute to offer for it. Yet crime, as he pointed out, is created by the law's definitions; and what may be a crime in one society may be acceptable behaviour in another. Thus Eskimos regard suicide and the killing of unwanted infants, old people and invalids, as a part of social life. In our own society civil and criminal offences differ not in kind but in the legal procedures which follow them. Criminal offences may derive from worthy impulses—from loyalty to an individual or a group—and repeated offences may be evidence of mental disorder or of an arrest in emotional development, fixing the criminal at a gain-loss level of behaviour. Legal interest in crime turns on the guilt of the accused—medical interest on his personality. Acquisitive, aggressive and sexual crimes depend on instincts and are associated with an emotional quality; yet it may be not immediately apparent from the crime itself what instinct is at work. Thus, while most offences appear to be acquisitive, many of them spring from the parental or the self-preservative instincts; and some cases of burglary are primarily sexual. It has been suggested that the decision should be taken out of the jury's hands and settled between the judge and a medical referee, but this Dr. East believes to be a pernicious suggestion. It is impossible to form a fair estimate of a man's case by examining him in court. The prisoner needs to know he has the sympathetic interest of the psychiatrist before rapport can be established. He thought it might be better to let the jury decide whether the man was guilty of the crime or not, leaving it to a medical and legal tribunal to decide on his responsibility before sentence was passed. It would be an intolerable burden on psychiatry in its adolescence, he considered, to have to pass the final judgment on responsibility in a criminal case. As things stand he feels the courts would be best served if they refused to accept evidence on the psychiatric aspects of a case from non-medical psychologists, and if medical men of no psychiatric experience refused to be drawn into giving opinions on those aspects in the witness-box. As the study of culpability progresses it may become possible for psychiatrists to help lawyers in the task of recasting the McNaghten rules to meet changing opinion; but extravagant statements in the witness-box can only delay this. At present justice can only be done to the abnormal offender if the psychiatrist is consulted: but he thinks the treatment of crime might be jeopardised if the public supposed the medical profession wished to disrupt all ordinary criminal measures. He mentioned the advances foreshadowed in the bill on criminal justice being considered before the war. There it was proposed that prison for young offenders should be replaced by remand centres and state remand homes. In the course of an investigation at Wormwood Scrubs he had recommended that a special institution should be established for the investigation and treatment of psychiatric disorders in convicted criminals, with the aim of amending their behaviour. Thus despite his disclaimers, it seems that Dr. East is not averse from whittling the penal code into more modern shape even at this stage of psychological progress.

KALA-AZAR IN THE EAST AFRICAN FORCES

KALA-AZAR has long been known to be endemic in the Sudan, and before the war cases were occasionally seen in the Northern Frontier Province of Kenya. For the 8 years before 1939 no instance of the disease was reported in Uganda or Tanganyika; Italian doctors had, however, recorded its presence in Abyssinia. Anderson[1] reports that in February, 1941, an askari in the East African Forces was found to be suffering from the disease and since that date 136 Africans have been admitted to military hospitals in Kenya; 43 (32%) of these died. Accurate details of the movements of most of the units to which the patients belonged were obtained, and it was found that 87 soldiers contracted the disease near the mouth of the Omo River at the south-western corner of Abyssinia near Lake Rudolf; 12 came from the Uaso-Nyiro district, and 11 were located on the Nairobi-Addis-Ababa road; 8 came from Southern Abyssinia. The relatively large infection of the Army personnel indicated that kala-azar is far more common in Southern Abyssinia and North Kenya than had been suspected; a survey of the civil population would probably support this. G. Maclean found Leishman-Donovan bodies from spleen punctures of civilian natives. V. D. van Someren identified the sandfly, *Phlebotomus congolensis*, in the area and it is believed that other species may be vectors. Most of the infections took place during the wet season, and the probable mean incubation period was 13 weeks. The early cases could only be treated by tartar-emetic injections and in them the mortality was 50%. Far better results were obtained by the administration of diamidinostilbene—a compound related to urea—and 'Urea Stibamine' (Pharm. Products), an antimony preparation.

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[1] Anderson, T. Farnworth, *E. Afr. med. J.* 1943, 20, 172.

YOUNG LIFE STILL WASTED

THE enormous reduction in the rate of infant mortality in the last half century—from some 150 deaths per 1000 live births in 1900 to 100 in the years preceding the last war and to just under 60 in the years before this one may, if we be not careful, too easily lull us into complacency. Certainly the Registrar-General's detailed analyses of how this loss of infant life is made up will, if one troubles to study statistical data at all, readily supply many correctives. A glance at his last prewar annual report (1938) shows, for instance, disturbing differences between the large towns. In that year more than 76 infants in each 1000 born died during their first year of life in the county boroughs of Birkenhead, Bootle, Wigan and Merthyr Tydfil; 35 per 1000 or less died in the county boroughs of Bath, Norwich, Oxford and Southend-on-Sea. If we exclude neonatal mortality the differences become still wider, for the former towns are left with rates of over 40 per 1000 at ages 1–12 months while the latter have rates of only 15 or a little less. Alternatively we may turn to the Registrar-General's monumental analysis of occupational mortality in the years 1930–32, which includes a study of infant mortality in relation to the occupation and social class of the father. In those years the death-rate per 1000 legitimate live births was for all classes 62, but it varied from 33 in social class I to 77 in social class V, rising steadily as one passes down the social gradations. Again exclusion of the neonatal mortality widens this difference, giving a rate of 11 per 1000 at 1–12 months for class I and 45 per 1000 for class V. A glance at the occupational figures shows such figures as 31 deaths in the first year of life per 1000 legitimate live births when the father was a doctor and 81 deaths when the father was a general labourer. Or turning to some of the causes of death we note that in social class I there were 1·4 deaths per 1000 live births from infectious diseases and 2·0 from diarrhœa and enteritis; in social class V the corresponding figures are 7·6 and 7·9 or 4 to 5 times as high. However we look at it we clearly cannot rest satisfied with the very great and undoubted improvement that has been achieved, and while such social and environmental differences persist there can be no reason for complacency.

A nasty jar to any such feelings has been given by Mr. Titmuss in his new book.[1] From a careful analysis of the Registrar-General's statistics from 1911 to 193 he is led to the conclusion that though all social classes have shared in the decline in infant mortality they have not shared equally. The already relatively low rate of social class I has shown a somewhat steeper rate of fall than the relatively high rate of social class V. In other words, in spite of imperfections in the data, it is most probable that the infant death-rates of the most and least favourably circumstanced classes were rather more widely separated in 1930–32 than 20 years earlier. At the very best, therefore, our efforts to reduce infant mortality, successful as they have been, have notably failed to reduce inequalities in the rate as one goes up or down the social scale and probably have expanded them. These and many other statistical observations Titmuss skilfully marshals as a stimulus to action. If, for example, he calculates, all social classes in 1930–32 had experienced the death-rates of social class I some 52,000 deaths in the first year of life would have been saved and 17,000 in the second year of life. Adding stillbirths would probably raise the total to nearly 90,000, no mean number in the present situation of the population.

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[1] Birth, Poverty and Wealth. Richard M. Titmuss. Hamilt Medical Books. Pp. 118. 7s. 6d.

The actual extent to which it is possible to reap further improvement is difficult to determine. The social factors of poverty, overcrowding, malnutrition and generally unsatisfactory environment are of course remediable to a much greater extent than has so far been achieved. Ignorance, apathy, lack of care, neglect of the rules of hygiene can certainly be reduced but never banished. Medical skill and attention can be extended and improved. Some few parts of the world have already reached a rate of 20 or less per 1000 live births. Dublin in 1928 suggested that a rate of 30 was feasible. Titmuss goes so far as to halve this figure and suggests that there are no medical, social or economic reasons why advanced communities should not reach a rate of 15. Whether that be utopian or not is hardly a matter of immediate concern. His study of the social and geographical variations shows how much there is yet to do at a very much higher level. It is a welcome corrective to any who with an eye fixed solely on the improving national rate think that all goes well.

VITAMIN A AND NIGHT VISION

NIGHT-BLINDNESS was attributed to scurvy by Captain Cook, even though it failed to clear up like other scorbutic symptoms when the patient got fresh lemons. Bampfield [1] noted in 1814 that fresh meat and vegetables added to the diet improved night vision, whereas antiscorbutics did not; yet he too regarded it as a manifestation of scurvy. The full picture of vitamin-A deficiency as it affects the eyes was described by Holmes Spicer [2] in 1893; he mentioned the greasy wrinkled conjunctiva with foam-like patches on it, and the dry lustreless cornea going on to keratomalacia. During the war of 1914–18 Birch-Hirschfeld [3] specifically mentioned a vitamin deficiency as the probable cause of the great increase in night-blindness in the German army during the winter of 1916. Bloch [4] attributed the outbreak of xerophthalmia in Denmark in 1917 to a deficiency of a fat-soluble vitamin, and the epidemic subsided immediately rationed butter at a controlled price became available to the population. Finally Wald [5] demonstrated the part played by vitamin A in the light-dark cycle of visual purple, and the real importance of this vitamin in the process of night vision was fully established. Since 1939, when complaints of poor vision in the blackout increased, [illegible]

[illegible] lack which, while causing no grave symptoms, is impairing general efficiency and night vision. At present we have no evidence that this is so, or that increased doses of vitamin A would cause any material improvement in the night vision of the population. It is the experience of Service ophthalmologists that many of those complaining of poor night vision do so for psychological reasons. Stephen,[6] of the Oxford Nutrition Survey has recently investigated the effects on 10 male volunteers—9 undergraduates and 1 university demonstrator—of a diet severely deficient in vitamin A. He found that after a month the dark adaptation of 8 of them became poor. After a single dose of halibut-liver oil, however, the light threshold fell sharply; and after a few further doses the original level was reached.

THE MINISTRY'S BULLETIN

THREE years ago the director-general of Army Medical Services began to issue an informal monthly bulletin available to all his officers and to others concerned. The *Army Medical Department Bulletin* has proved a convenient means of keeping the periphery in touch with the centre, and the Admiralty, which already provided every wardroom with a first-class review of current affairs, has now followed the example of the War Office in producing a special broadsheet for medical officers. In civilian medical services there is less likelihood of professional isolation than in the Army or Navy, but it is none the less advisable that the men at the centre should be able to communicate ideas which have not yet hardened into official memoranda; and in all branches of work it is well to have a medium for circulating suggestions, reports, and other expressions of experience. In war-time the suspension of the two annual reports from the Ministry of Health on the State of the Public Health and the Health of the School Child has deprived medical officers of health and school medical officers of much useful information about departmental policy, and we are all the more glad therefore that the Ministry has now decided to issue a monthly bulletin. This will be combined with the existing monthly bulletin of the Emergency Public Health Laboratory Service—a service directed by the Medical Research Council on behalf of the Ministry of Health—and the combined bulletin will comprise a general section edited from the Ministry and a laboratory section edited from the Council. In the first joint issue, dated October, the former section consists of short signed articles on the antigens of enteric organisms (Dr. V. D. Allison), war-time statistics (Dr. Percy Stocks) safe milk (Dr. W. A. Lethem) the supply of tetanus antitoxin (Mr. C. H. S. Frankau) and child guidance clinics (Dr. A. F. Alford).

DR. J. W. BROWN will deliver the Bradshaw lecture to the Royal College of Physicians of London on Thursday, Nov. 4, at 2.15 PM. His subject is to be the interauricular septal defect.

MR. H. S. SOUTTAR is to give a Bradshaw lecture to the Royal College of Surgeons of England on Thursday, Nov. 11, at 3.15 PM. He will speak on physics and the surgeon.

Lieut.-General Sir ALEXANDER HOOD, director-general of Army Medical Services, is visiting the United States.

LECTURES IN SURGERY AT EDINBURGH.—During the autumn the following lectures will be given at 2 PM on Tuesdays at University New Buildings, Edinburgh: Surgeon Rear-Admiral G. Gordon-Taylor, the dramatic in surgery (Oct. 26); Prof. W. C. Wilson, the general state of men severely wounded in battle (Nov. 2); Colonel J. A. Macfarlane, carcinoma of the rectum and sigmoid (Nov. 9); Mr. James Riley, experimental cancer research (Nov. 16); Brigadier George Riddoch, sciatica (Nov. 23); Prof. C. F. W. Illingworth, peptic ulcer (Nov. 30); Colonel Johan Holst, [illegible]

ROYAL SANITARY INSTITUTE.—A meeting will be held at the Pump Room, Bath, at 10.15 AM on Saturday, Nov. 6, when Mr. A. Tyler, chief sanitary inspector for the city, will read a paper on food standards, and Mr. J. Owens, city engineer, a paper on some aspects of the postwar housing problem. Further information may be had from the local secretary Dr. James Blackett, Health Office, Sawclose, Bath.

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[1] [illegible]
[2] [illegible] 13, 45.
[3] [illegible] 1917, 92, 273.
[4] [illegible]
[5] [illegible]
[6] [illegible] 52, 259.

Special Articles

SOCIAL INSURANCE AND MEDICAL SERVICES ABROAD

PROFESSOR HERMANN LEVY

In its comprehensive report on social insurance, published in 1936, the International Labour Office observed that when sickness insurance funds were first set up, their main purpose was to provide cash benefits for sick persons, and that they paid comparatively little attention to medical treatment. The report was glad to emphasise that this attitude had changed: "The principal object is now to restore health and working capacity, and first place is therefore given to medical, surgical and pharmaceutical benefits."

Unfortunately this statement does not hold good of social insurance in Britain. In this country neither National Health Insurance nor Workmen's Compensation has been based on, or developed into, really restorative medical services. The agencies entrusted with administration of this section of social insurance, such as approved societies, insurance committees, mutual indemnity associations and insurance companies, have shown little or no interest in developing medical service systematically or dynamically. This is not altogether their fault. Far more is it the fault of legislation which did not include full restoration to health among statutory obligations under the insurance schemes, and which—through such unhappy arrangements as those of lump-sum settlements or the "light work" provisions of workmen's compensation—even drew away from the aim of restoration to health.

BRITISH NEGLECT OF FOREIGN EXPERIENCE

It cannot be said that such aims were not before the eyes of the early British insurance legislators. One may recall that in 1913 an official Report on Medical Benefit under the German Sickness Insurance Legislation (Cmd. 6581) explained that the German local sickness funds were giving "a very liberal interpretation to medical treatment," and that the insured were able to get elaborate specialist treatment without much formality. Yet the most recent valuation of National Health Insurance shows that about five-sixths of the additional treatment benefits, which would be expected to cover the more refined medical services of all kinds, went into dental and ophthalmic benefits, which in most other countries are included into the ordinary statutory benefits as a matter of course.

There can be no doubt that the alienation of the British social insurance services from medical treatment problems has brought the whole system of social insurance into disrepute. Whereas abroad social insurance has fully justified the expectations of the medical profession and social reformers, in Britain Sir William Beveridge could apparently draw no other conclusion from the medical deficiencies under which the health insurance services labour than to propose to divorce the medical service of the nation once and for all from the insurance machinery—which according to his plan would only remain as a contributory automaton and lose all its possible constructive and productive functions. It would, if the plan were accepted, contrast with almost all other schemes in the world. Yet, since the Beveridge plan was published the difficulties of creating a comprehensive national health scheme having no connexion with insurance administration, have become only too manifest. Would it not therefore be appropriate to abandon an "isolationist" attitude and devote some study to the methods by which for decades foreign self-supporting insurance institutions have successfully developed medical services, including specialist treatment, rehabilitation, the supply of appliances and medical and surgical aids, hospital care, treatment in sanatoriums, nursing and maternity services?

Perhaps the neglect of foreign experience is partly explained by the fact that reform on the international pattern would lead neither to the creation of a national medical service, centralised and divorced from social insurance, nor to the retention of the present system of roved societies and insurance committees under NHI. ne asks what fundamentally has enabled foreign systems of sickness insurance, introduced in countries less wealthy than Britain, to achieve such high medical results, the answer lies not in any greater efficiency of the medical profession abroad, but simply in the fact that [illegible] social insurance has been, and still is, [illegible]

SICKNESS FUNDS ABROAD

In almost all countries it has become customary to entrust sickness funds with the task of medical service under insurance schemes. Such funds are mostly local sickness funds; more rarely they are occupational funds of groups of workers or of big undertakings. But they are not competitive and not organised in an entirely fortuitous and disintegrated way, as approved societies are. They are funds which have to deal year by year on a territorial basis with an almost steady risk or sickness expectation; they are in a position to review in detail the special medical needs of any district, urban or rural; and by a flexible rate of contributions—in contrast to the crude British flat-rate system—they are enabled to adapt their income to their specific medical needs.

These bodies are not purely "communal"; their administration is entrusted to representatives of employers and employees, subject of course to the necessary supervision and control by public authority. It is this administrative basis that provides these social insurance agencies with the impetus and the financial means to carry through, with the help of the medical profession, any desirable medical schemes. Their counterparts in the field of industrial accident insurance are mutual indemnity associations, or workmen's compensation boards, composed of employers and representatives of workers, responsible for administration of the statutory provisions of industrial accident insurance as they also relate to medical treatment and full restoration of the severely injured. These latter bodies are generally grouped according to classified industries, for thereby they are best able to comply with the particular requirements of the various types of industrial diseases.

It is on this financial and administrative basis that sickness funds and workmen's compensation abroad have achieved their most striking results. It should be noted that such results have not been reached by centralised planning but by the decentralised effort of local and other insurance groups which were impelled by their own enthusiasm as much as by legislation. The speed of providing what is called "medical equipment of insurance institutions" has been remarkable—more remarkable perhaps than it would have ever been under state schemes. In Poland, for instance, where the relevant provisions did not come into force until 1920, the funds, or their federations, had by the end of 1924 as many as 312 clinics, 116 pharmacies, 55 hospitals, 1 maternity home, 7 sanatoriums, 18 rest homes, 39 X-ray institutes, 60 ultraviolet apparatus, 23 analytical laboratories, 1 biological laboratory, 5 pharmaceutical laboratories. Lately the social insurance funds in Peru, Ecuador, and Bolivia—also newcomers in the field—have begun to create a network of hospitals and clinics of their own in order to make up for deficiencies in the national health equipment. In Czechoslovakia each sickness fund must belong to a federation of funds whose duties include the establishment and management of hospitals and pharmacies.

Writing just before the advent of National Socialism under which the social insurance services rapidly deteriorated, Dr. G. F. McCleary gave the following account of the achievements of some of the German local sickness funds; the General Local Sickness Fund of Hamburg had then 4 institutes for artificial sunlight therapy where about 7000 persons were treated annually, and a large orthopædic institute with its own workshop for making appliances. Diagnostic facilities were provided on a large scale. The institute of the Association of the Local Sickness Funds of Berlin contained chemical, pathological, bacteriological and serological departments, and made 5000–6000 examinations monthly. The miners' sickness funds (occupational funds) had founded many model hospitals for the special needs of the population in mining districts.

SPECIALIST FACILITIES UNDER SICKNESS INSURANCE

The International Labour Office states that in some countries "clinics have become the centre of the medical work of the funds from the point of view both of diagnosis and of therapeutics. They make it possible to concentrate the medical service, placing at its disposal all the necessary appliances." Among others, dental institutes have been set up by the sickness funds in many industrial towns in Central European countries and these institutes have drawn the attention of the working population to the importance of dental treatment. It should, however, be noted that this kind of organisation does not imply that the insurance funds must exclusively rely upon their own institutions. Specialist treatment may be given by arrangement between the insurance societies and outside institutions of all kinds. The experience has been that if properly equipped the clinics of insurance funds, have, in the words of the International Labour Office "many advantages that the consulting rooms of doctors, who work without the assistance of a staff, do not possess"—an observation that should be particularly noted in connexion with *the present discussion about health centres*. Although leaving perfect freedom to panel practitioners, the institutions of the sickness funds have been able to act as such centres if so required. Their vast range of diagnostic and research facilities has appealed to doctors and in this way, as McCleary said, have become one of the most important links between the funds and practitioners, who, apart from their daily routine work, aim at following up their particular studies and medical interests.

This is no small achievement of the organisation of social insurance abroad. The result has been that the medical profession in those countries feels just as much in need of the insurance institutions as these are in need of professional services.

HOW IS THE DOCTOR EMPLOYED?

First rate medical equipment is, however, only one of the necessities that sickness funds have to provide in order to fulfil their obligation of medical treatment. Not less important is the supply of the personal medical service. "Medical benefit has remained a general practitioner service in Great Britain, *but nowhere else*," said the International Labour Office in 1942. It is perhaps for that reason that the administration of NHI in Britain has done little to make insurance practice particularly attractive. Where, as in other countries, such practice includes the services not only of the rank and file, but also of the highest medical authorities, insurance institutions have to make the service as attractive financially as the economical administration of benefits allows.

In Western Europe the medical service of compulsory sickness insurance is organised very largely on the lines of private individual practice. Negotiation between [illegible]

overcrowding of the service. The prevailing method of remuneration is by a fee varying with the nature of the treatment given to the patient; the annual capitation fee adopted in Great Britain for its practitioner service remains an exception, and can be explained only by the fact that the restriction of medical treatment to the general practitioner under NHI makes possible this crudest form of remuneration. In some countries sickness funds in the towns have salaried specialists to attend daily at the funds' clinics.

In Chile and Peru all insurance doctors are employed—though not always full time—on a salaried basis; and all ambulatory treatment is furnished at health centres by a group of practitioners and specialists. This arrangement, however, may not be so much due to particular advantages of the system as to the fact that sickness insurance in sparsely populated territories requires an organisation very different from that of densely populated districts. In Russia under the national medical service all medical workers of every type and of every grade are employed and paid by the state or semi-official bodies. On the other hand, as the example of New Zealand shows, nationalisation of medical service does not necessarily prevent the doctor from remaining a private person. In this the "social insurance" approach differs decidedly from the "social assistance" approach, the latter necessarily makes use of salaried doctors or salaried medical officers who may (as in Ireland) render every necessary kind of medical service, or who may (as in the rural areas of Norway and Sweden) perform public health duties besides treating the sick.

It has sometimes been argued that the existence of state or communal doctors need not interfere with the free choice of doctor by the patient, for he might be allowed to choose among many such doctors. This argument is purely theoretical. In practice—the official employment of full time salaried doctors would hardly be compatible with free choice. For if the official administration found that under free choice some of its doctors were less popular than others, it would encounter considerable difficulty in dismissing them.

A system of official doctors can hardly be run economically unless the insured population is under obligation to seek medical treatment from the doctor provided for them in their district or otherwise. To this arrangement insurance doctors of almost all countries have objected. In the words of the International Labour Office, "Medicine is a liberal p [illegible] portion of doctor [illegible] in public health [illegible] the leaders of their associations, have vigorously withstood the attempt of sickness insurance to regiment them in a salaried service." While under the present system of social insurance abroad the panel doctor or specialist may well retain his private practice among the well to do, the interests of his insured patient do not suffer; for every doctor, even the highly paid specialist, regards himself as a "partner" in the insurance fund and that its welfare is closely related to his own. This does not exclude possible restrictions in the extent of private practice, arising from the obligations of the insurance doctor towards the sickness fund. Nor does it exclude the further development of group practice under sickness insurance schemes without restricting the liberties of the individual practitioner.

REMUNERATION

Not less important than the method of employment is the method of payment. As has already been stated, the crude form of a uniform capitation fee is peculiar to Britain. The rule elsewhere now is that insurance general practitioners are paid according to services rendered—i e, per consultation or per visit—or according to the number of cases treated. In addition, special fees may be paid for extra services such as the reduction of dislocations, the setting of fractures or treatment by injections. Specialists are everywhere paid higher rates than general practitioners.

Naturally there are many variations in detail. In France, for instance, the Minister of Labour and the Superior Social Insurance Council jointly prepare a tariff of fees payable to practitioners or specialists, for advice in their consulting rooms, different rates being fixed for large towns, medium-sized towns and other areas. Germany in 1932 adopted a system of payment which may be called a refined and adjusted capitation fee. The individual practitioner's share of remuneration is calculated according to a graduated scale, in which the rate per case treated falls when the number of cases treated rises. In Hungary there is a fixed basic salary and special allowances for extra services, night visits, consultations and of course mileage. The annual fixed salary is based on the daily number of hours at the dispensary. Similar methods have been adopted in Poland. In Germany the system of remuneration also takes account of the personal situation of panel doctors; thus, if they have large families or are unable to make a living out of insurance practice because they work in distressed areas they may get special allowances.

These examples, different as the various methods of remuneration may appear, illustrate the tendency to adjust the remuneration of practitioners to different economic conditions thus avoiding the possible inequities inherent to the rigidity of the British flat rate capitation fee. Any progress in British social insurance, and particularly the inclusion of dependants and special treatment in National Health Insurance will necessitate the adoption of more liberal and flexible methods for the payment of insurance doctors. Much can be learnt about such methods from experience abroad, where social insurance, on the whole, has constantly invigorated the medical services.

Far from being divorced from medical organisation, social insurance in other countries has become an integral part of it.

SCOTTISH HOSPITALS

THE HETHERINGTON REPORT

THE main principles of hospital policy after the war were outlined by the Minister of Health in October, 1941. They were to provide a comprehensive service for all who need it; to do this through the larger health authorities, who will thus have the duty of putting the partnership between voluntary and municipal hospitals on a regular footing; to base the service on areas larger than those of individual authorities; to ensure that the patient pays a reasonable contribution towards the cost of treatment, whether through contributory schemes or otherwise; to assist local authorities with any new burdens by means of Exchequer grants; and to provide special educational grants for teaching hospitals.

The committee on Scottish postwar hospital problems, set up by the Secretary of State for Scotland in January, 1942, was not called upon to design a hospital policy, but to solve as far as possible the administrative problems which the Government will face when it comes to implement the comprehensive regional policy already foreshadowed. Within this policy the Scottish Committee were required to make recommendations on:

(1) the future administration of new hospitals built and at present administered by the Government as part of the EMS;

(2) the arrangements most likely to secure the maximum cooperation between voluntary, local authority and EMS hospitals: and

(3) the financial arrangements between voluntary and local authority hospitals and patients and contributors best fitted to enable those hospitals to cooperate in the coördinated hospital service.

The committee, under Sir Hector Hetherington as chairman, have met 31 times and now publish their report.[1]

In a lucid introduction they note that their main task has been to work out a method of partnership between the voluntary and statutory authorities; and they have proceeded on the assumptions that the dual system of voluntary and municipal hospitals will continue after the war, and that a statutory duty will be placed on county councils and town councils of large burghs—singly or combined—to initiate and maintain arrangements for a comprehensive hospital service on a regional basis.

THE FUTURE OF EMS HOSPITALS

Their conclusions about the EMS come last in their report, but since they are brief and straightforward may conveniently be mentioned here. The committee suggest that once the war is over the seven new hospitals, offering 7000 beds for war-time purposes, and probably about 5000 in peace-time, should no longer be administered by the Department of Health. In proposing this, they are making no adverse reflections on the Department; but they feel that "the effects of the existing partition of the field between voluntary and local authority enterprises (with all the potential impediments to easy cooperation and the possible clash of interests inherent in such a situation) should on no account be intensified by the permanent intrusion of a third hospital authority." They therefore advise that the hospitals should be handed over to one or other of the existing types of authority. Since the responsibility for providing adequate hospital facilities in the region is to fall on the local authority, the hospitals should normally, they think, be transferred to such authorities, though not necessarily to the local authority of the area in which the hospital happens to be situated. However, they think that local circumstances may sometimes make it preferable to allocate an emergency hospital to one of the voluntary bodies or perhaps to a voluntary body acting in conjunction with a local authority. Terms of transfer, they consider, should be easy because the siting and design of many of the EMS hospitals were conditioned by necessity rather than choice, and because at the time of handing over they will no longer be in mint condition. They note, too, that the fabric of these hospitals "will, with proper maintenance, retain its utility for anything up to half a century," and that the buildings when obsolete can be scrapped with equanimity.

COOPERATION BETWEEN HOSPITAL AUTHORITIES

The main problem—that of providing a basis of cooperation between voluntary and municipal authorities—could not be so easily solved; and the committee acknowledge the tentative nature of their conclusions in the phrase: "We realise . . . that our recommendations may themselves speedily be in need of change."

The development of the voluntary hospitals from purely charitable foundations to institutions subsisting in part by the contributory and provident schemes of patients is reviewed, and they point out that the main implication of the term voluntary is that such institutions are not governed by any agency of local or central government, but usually by boards of management composed of prominent people and of representatives of various interests. These interests include bodies of subscribers and industrial contributors' organisations. Any attempt at coördinated action between voluntary and municipal hospitals, in their view, must be attended by changes in the present system in both. Thus voluntary hospitals must begin to pay those members of the medical staff who at present give voluntary service: for it is felt that nothing would be a "greater impediment to the idea of partnership and reciprocity . . . than the persistence . . . of a situation in which doctors were or were not paid for their services according to which class of hospitals they serve." In the municipal hospitals the hierarchical system should be modified, and the committee suggest that at any rate the senior medical staff should have independent access to the governing body of the hospital.

REGIONAL COUNCILS

As the main instrument for carrying out the accepted policy the committee proposes the regional council. The regions should be defined, they hold, by the Secretary of State, though their own suggestion would be for five regions, pivoting on the four medical schools and Inverness. They see the councils as purely advisory bodies, exercising influence, not power. This limitation is necessary, they believe, because the duty of ensuring adequate hospital services will be laid on the local health authorities; and it would be difficult, they feel, and perhaps impossible, "for local authorities to transfer to these regional bodies the executive responsibility which will be imposed upon themselves."

The proposed composition of the regional council deserves careful note. The committee suggest that the local authorities and the voluntary hospitals should have equal representation on them, and that there should be a chairman independent of both parties, nominated by the Secretary of State. They suggest twelve representatives each from municipal and voluntary bodies, appointed by these bodies themselves, and a small group representing the medical and medical-educational interests of the area: these last perhaps to be assessors rather than voting members. Thus the voluntary hospitals would have equal representation with the local authorities on a regional council exercising influence. The local authorities would exercise power in virtue of the statutory duties laid on them to provide an adequate service; and would also have equal representation with the voluntary bodies on the regional council.

The committee further suggest that the regional council should influence the choice of candidates for the more permanent posts in both voluntary and municipal hospitals through a regional appointments committee. The final choice would lie with the hospitals themselves. Some special provisions for the large South-Western Region, relating to the appointment of sub-regional councils, involve no differences of principle and need not be set out at length here.

The committee as a whole did not favour the establishment of a national consultative council, though there were four dissentients out of the eleven committee members.

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[1] Report of the Committee on Post-war Hospital Problems in Scotland. Cmd. 6472 HMSO. Pp. 44. 9*d*.

FINANCE

The report sets out clearly the reasons why the voluntary hospitals, as well as the local authorities, will have to look to the state for some part of their support in the postwar world: in their view, "under postwar conditions it will be impossible for the voluntary hospitals to continue to offer the volume and range of services which they offered in 1938–39 on the sources of income then available to them." There are several reasons for this change in the financial position of voluntary hospitals. Their expenses will be increased not only by the rise in cost of materials but by salaries payable to the medical staff, and higher standards in the pay of nurses. Charitable donations are likely to fall off with the establishment of a universal insurance scheme; for as the report puts it, "even the charitably disposed have no passion for giving money merely to relieve rates and taxes." There will therefore be little motive for making gifts unless they can be earmarked by the donor for a distinctive purpose. The committee recommend a compulsory contributory [illegible] tensive with whatever socia[illegible] be introduced; and they [illegible] of payment involving the assessment and recovery of charges from patients at or near the time of actual treatment." They assume that the fund created by this levy will have to [illegible] other sources. The insurance [illegible] view, include maintenance as [illegible] treatment.

They propose rather a complex method of financing the hospitals. The contributions of the insured would form a central hospitals fund, and this would be supplemented by an Exchequer subsidy; and this fund should be capable of meeting 60% of the total cost of services provided in the voluntary hospitals and the corresponding municipal general hospitals. The distribution should be related to the services rendered, and claims for payment would be made to the Department of Health. This [illegible]

[illegible] provide additional services but also to provide financial aid to voluntary hospitals for work done by them within the approved hospital scheme; and towards both kinds of expenditure the authorities will receive an Exchequer nt. The committee suggest that the authorities each of the five regions should be required to pay ually a sum calculated on the rateable valuation of ir areas, or on the basis of population, and that the d so formed should be distributed in each region by mall committee appointed by the Secretary of State. ernatively an Exchequer grant might be made directly the voluntary hospitals and distributed by the prosed [illegible]"

Sir [illegible] a reservation to the ort. [illegible] as too complex; and ggests that there is a good case for a state grant yable on a bed-complement formula to every qualifying luntary hospital. This, he thinks, would entail appearance of both the state supplement to the ntributory fund and the special state grant. Under [illegible] l authorities would [illegible] iture would depend [illegible] uthority provided; [illegible] from the central spitals fund, from rates and from government grants. luntary hospitals would get their income from perment endowments, payments for service from the tral hospitals' fund and an Exchequer grant callated on bed-complement; any deficit would have to made up from voluntary contributions and by grants m the local authorities—which of course would attract the local authorities a proportionate share from the chequer.

Two other smaller points in the report are worth ting. The committee specifically recommend that determining the financial position of the voluntary spitals for the purposes of the local authority grant, proportion of strictly charitable or voluntary income should be left for development. In other words, the voluntary hospital will not have to draw in its horns and reduce expenditure to a minimum: it is still to carry on its traditional task of extending the study and practice of medicine—a task in which the municipal hospitals are now beginning to share. The report also recommends that where adequacy of standard of service in a voluntary hospital is in question, the local health authority should be able to ask the Department of Health for Scotland to undertake an expert impartial investigation.

THE CLYDE BASIN EXPERIMENT

In an attempt to prevent the breakdown of warwo[illegible] of [illegible] be [illegible] about whose health they were concerned; sometimes the reference was prompted by industrial medical officers whose coöperation had been sought.

In its early stages the experiment was confined to workers under the age of 25 and to the densely populated Clydeside area. Patients so referred were examined by consultants where necessary, and if it was felt that further investigation was indicated, they were admitted for it to hospitals of the Emergency Medical Service. Patients requiring a period of convalescence to prevent breakdown in health were sent to one of the country houses functioning as auxiliary hospitals in the Emergency Hospital Scheme. [illegible] under the scheme were c[illegible] these conditions of deb[illegible] severely prejudice well-being and working efficiency without necessarily causing complete breakdown and absence from work.

The experiment was a success. In the course of a year it dealt with some 1400 young people and at the end of the year it was extended to cover workers of all ages in the entire Scottish industrial belt; by the end of last June the total number of persons dealt with had risen to 4126. A detailed analysis of the first 1240 cases is presented in a brochure issued by the Department of Health for Scotland,[1] which shows that their ultimate disposal was:—

	Males.	*Females.*	*Total.*
1. Failed to appear	34	45	79
2. Hospital waiting-list cases	17	6	23
3. Referred to local authority for further action	15	17	32
4. [illegible]	45	34	79
5. [illegible]	77	87	164
6. [illegible]	45	82	127
7. [illegible]	3	1	4
8. Sent to convalescent home	44	125	169
9. Sent to base hospital	221	342	563
Total	501	739	1240

Among the conclusions drawn by the Department from a general review of the experiment are the following:

1. There is need for facilities such as are provided under the scheme, though not necessarily on exactly the present lines—admittedly experimental.

2. At present too many of the cases of fatigue carry on until unfit for work when the period required for return of capacity is prolonged. More adequate facilities for ordinary (e.g. weekend) rest and recreation would help to prevent some of the conditions found.

3. Much of the vague ill health encountered was due to long hours of work, travelling difficulties and inappropriate dietaries as is evidenced by the large proportion of cases without serious organic disease.

4. The vast majority of the patients sent for convalescence have benefited by the rest and change provided. The removal of fears of serious disease by complete medical overhaul provides the reassurance so helpful in expediting recovery.

5. The hospital reports must be of value in affording to the patient's own doctor a useful background not only for present but for future reference.

6. The proportion of cases with early organic disease elicited in the course of hospital investigation but not detected by ordinary clinic and specialist facilities is small. Where institutional admission can be most helpful in such cases is mainly in the elucidation of causal factors.

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[1] Health and Industrial Efficiency: Scottish Experiments in Social Medicine. Edinburgh. HMSO. 1943. 1s.

7. Certain difficulties have been encountered—difficulties in securing full realisation of the potential value of the scheme, alike in relation to the well-being of the patient and his working efficiency. It is not easy to arouse enthusiasm for a scheme that is essentially preventive in its approach.

The Department notes, however, that it has come to be realised, to an extent seldom appreciated in time of peace, that the disabled man may be a potential asset, even where complete restoration of function cannot be secured—provided always that to the best efforts of medicine are added an enlightened industrial approach and a determination to place the disabled in suitable work. This growing recognition of the essential relationship between health and industrial efficiency is one of the valuable outcomes of war, one of the present gains that surely must not be lost in times of peace.

ARMS PRODUCTION AND THE MAN

Sir WILFRED GARRETT, reporting as HM chief inspector of Factories[1] says that the outstanding feature of last year was the more important position assumed by women in the industrial structure of the country. In many respects this has made for the improvement of factory conditions: it has led to "a remarkable stimulation of public pressure for better standards of washing and clothing accommodation, and a higher standard of cleanliness throughout all the amenities and in the workrooms themselves."

Dr. E. R. A. MEREWETHER, who has succeeded Dr. J. C. Bridge as senior medical inspector, believes that as far as the major specific causes of industrial sickness are concerned there is no cause for alarm but rather the reverse. On minor non-disabling sickness it is harder to be definite, for the records are inadequate and one must rely on personal impressions.

"One of these is that minor septic conditions like boils, are increasing, as also is the affection which came to be known as 'trench mouth' during the last war. This points to some slight reduction in tissue resistance, due to several causes acting solely or jointly. Fatigue from an over-zealous desire to get on with the job, or rather the several jobs which are our individual lot today, may be one, particularly when individual personal worries or strain are added to the daily effort."

"Undue and cumulative physical fatigue due solely to hours and conditions of work is not generally a deleterious factor in the healthy adult under present conditions; but there is a limit to the secondary jobs which can be taken on in addition, however enthusiastically they are urged, and however willingly they are accepted. The physically immature and the older sections of the community must be watched in this connexion, and particularly the hours of work of the former."

Miss ISABEL TAYLOR, deputy chief inspector, describes an investigation into the actual hours of work of young persons in all types of factories in representative industrial centres. Of "young persons" over 16, it was found that 85% of the boys and 89% of the girls were working 54 hours or less, while 48% of the boys and 55% of the girls were working 48 hours or less. Of those under 16, 30% of the boys and 37% of the girls were working 44 hours or less, while the remainder (except a very small number employed illegally) were working between 44 and 48 hours.

Examples are again given of the effect of changing hours of employment:

In a small factory in Birmingham which had returned to their normal working hours of 47 for the males over 16 and 44 for those under 16, the output was as high as when 54 and 48 hours respectively were worked.

In a factory in the Black Country men had been working on the day and night shift system, averaging 52½ hours a week. They changed on to three 8-hour shifts, six turns a week, making a working week for each member of the shift of 45 hours. The output of each of these shifts was equal to what it had been in the 52½ hour week.

A firm of toolmakers in South London began to employ women and decided to reduce the hours of the men, by dispensing with Saturday afternoon employment, to 55 a week in order to make them coincide with the hours of the women. At the same time they changed the system of payment from a weekly to an hourly basis in such a way that the amount earned by each man was not altered by his shorter hours of work. The result has been most satisfactory. Production has, with the shorter hours, if anything slightly increased.

The year 1942 saw a r[illegible] part-time workers. Most of thes[illegible] household responsibilities, or men and women who have retired; but some are people like teachers and students who give some of their spare time to factory work. "Opinions vary as to the quality of the part-time workers, but on the whole the system seems to be working very successfully. In some cases the hourly output is said to be greater than that of full-time workers and the lost time less."

Generally speaking the most popular arrangement of the hours of part-time workers is that of morning and afternoon shifts, usually of 4–5 hours; but there are many variations. Thus in a nut and bolt works 40–60 married women are employed on a night shift between 10 PM and 6.30 AM, working for three nights a week. This arrangement is said to be satisfactory to the mother because her husband can be responsible for the children during the night and she can give the family breakfast and see them off to school before taking her day's rest.

Miss Taylor quotes a case in which "women" 14 and 15 years old were found to be working nearly 60 hours a week and on Saturday afternoons and Sundays. Inspectors, she says, have usually been well supported by magistrates in cases which it has been necessary to bring before them; "and this support seems to bear out our general impression that public opinion, no less than the opinion of those who are immediately concerned in the factories, is tending more and more to depart from the view that in war-time long hours are themselves a virtue."

A GIFT FOR PATHOLOGY

Mr. W. H. Collins of Wexham Park, Bucks, has given £100,000 to the Royal College of Surgeons of England for the endowment of their department of pathology and the institution of a chair of human and comparative pathology there. In his will he has made provision for a bequest of a further £100,000 for the endowment of the department of anatomy and for the institution of a chair of human and comparative anatomy. In announcing the gift to the college, Sir Alfred Webb-Johnson, the president, read the following letter from Mr. Collins:

"MY DEAR PRESIDENT,—Throughout my career I have realised how essential is the study and investigation of basic problems. Success of armies in the field is dependent on careful planning and preparation at headquarters, and victories in the war against disease can only be achieved by due applicationand increased knowledge of the fundamental medical sciences. I have been greatly impressed with the value of the departments of anatomy and pathology which have made the Royal College of Surgeons of England famous all over the world. I have seen what grievous injury your departments have suffered as the result of enemy action and appreciate what a gigantic task it will be to restore them to their unique position in the scientific world. To embark upon this task it is essential that the departments shall have an assured income. . . I trust that my gifts will enable the council to proceed with confidence with their responsible task and to engage the services of men of outstanding ability to assist them in their labours."

Mr. Collins is chairman of the King Edward VII Hospital, Windsor, and of the voluntary hospitals advisory committee of the Berks and Bucks Divisional Hospital Council. He is also a vice-president of the Middlesex Hospital and has built, equipped and endowed the X-ray diagnosis department there.

ROYAL SOCIETY OF MEDICINE.—On Monday, Oct. 25, at 4.30 PM, Mr. Harold Chapman, LDS, will deliver his presidential address to the section of odontology. He will speak on prognosis in orthodontic cases. On Oct. 26 at 4.30 PM at the section of medicine, Dr. Geoffrey Evans will give his presidential address on mental health, and Surgeon Captain Desmond Curran will open the discussion which is to follow. Mr. E. W. Riches is to give his presidential address to the section of urology on paralysis of the bladder on Oct. 28 at 5 PM.

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[1] Report of the Chief Inspector of Factories for 1942. [illegible]don. HMSO. 9*d*. (Cmd. 6471).

In England Now

A Running Commentary by Peripatetic Correspondents

IN the mad hurly-burly of medical plotting and p[illegible]ant, the silence of the Board of C[illegible] his once august body . . . How [illegible] were we private asylum wallahs solemnly instructed that THE BOARD, so sensitive and so jealous of its name, might be easily confused with those other liquor and betting groups if the all-important "THE" was ever omitted! This ancient self-sufficient authority . . . How happily I remember my first encounter when as a very young medical officer I was commanded to present myself (in those days we had to be formally inspected by a member of THE BOARD before we could join for duty) and was received as if I were the heir of all the ages. Then, later, those other encounters with the legally courteous Trevor, and the clinically confident Needham (great names to us in the asylums) and [illegible] in tl[illegible] to b[illegible] the Cecil, until we went red all over and shrieked our annoyance, whereat he would jab us with his trident wit and we poor fish . . . Ah, well! times certainly have changed. Which reminds me that only the other day I was with a neighbouring colleague of many years of senior service when the arrival of two visitors of the Board was announced: "Shades of the Great Consultants!" he groaned, "an assistant medical officer and a school teacher! Last year we had a hospital matron and a social worker, next year I have no doubt it will be an occupation therapist and a lay psychologist." "Hey!" he called back over the 'phone, "I'm out! Ask the matron and Dr. C. to take 'em round." Dr. C., he explained, was the holiday locum. But, where am I? O yes, that once august body, that ancient self-sufficient authority, THE BOARD OF CONTROL, will it seek to regain something of its pristine splendour in the new worlds now a-making? The Board is older than the Ministry of Health, in which today it plays but a minor part. Long before the Ministry was formed the Board managed its own affairs and was a law unto itself. In that new and mighty commonwealth of the Ministry-To-Be could not the Board demand dominion status? It could. It could become the Department of Mental Health in the new Ministry. Enlarged by the addition of medical men of proved organising ability and administrative experience, it could take over all the mental hospitals and mental deficiency institutions from the local authorities and embody them in one comprehensive service for the whole country. It could coördinate all the mental welfare and mental after-care work now being done by voluntary associations and eventually absorb such activities into the national mental health service. It could . . . There's that telephone, and I've been caught napping again! Why does one grow old—and dopey?

* * *

TO ANY VIRUS

Art thou our father, infinitely small,
who first snatched life from earth's insensate crust,
still held by stricter laws that govern dust,
dissolved or crystallised, yet siring all?
Or art thou just some catalyst that grew
jealous of life [illegible]
death to the [illegible] er died,
humbler of h[illegible]
Secret of life, or d[illegible] !

* * *

Is there anything else in surgery so dramatic as cæsarean section? After taking part in many a score I still feel that thrill when the infant is delivered that I felt the first time I saw it. Other operations may be life-saving: this has the appearance of life creating, a surgical miracle. Surely if one wished to show a layman the sensational possibilities of a surgical operation, it is to cæsarean section that he should be conducted. He sees on the operating table an amorphous towel-clad mass, presumably human and feminine though he can distinguish nothing to tell him that. A few strokes of the surgeon's knife, a gush of fluid, the hand pushed in where the fluid came out and next minute an infant is squeaking on the tray which a nurse has ready. Our last operation of this kind produced the largest infant in my experience. He weighed over 13½ lb., and moreover he was, unlike many of the newborn, a comely infant; he looked for all the world like an exaggerated Rubens cherub. A few days later I had a chat with the mother. She was a woman of ordinary stature, and said that her husband is a little man, "but," she added, "my own father is a very big man." So the infant harked back a generation for his splendid inches.

* * *

This year the hospital has been even more vegetable minded than last, when we had our first vegetable show. In addition to the old campaigners the theatre staff got busy early in the spring on a patch which hitherto had been rather a no-man's-land. Theatre sister was heard to complain at planting time that her site got no sun until the afternoon and was not really consoled when someone pointed out that double summer time would soon cure that. However the marrows, beans, peas and lettuces which later rewarded the labours of her team amply repaid their efforts. G Ward had a good crop of garden peas, and the high spot was provided by the convalescent small boys who picked a good basketful of peas and having de-podded them stuck a label on the basin with the inscription, "There are 605 peas in here." At the middle of August our second annual show was held. Entries were good—almost double last year—and the *3d.* entrance fee has benefited *the War Savings Campaign by over fifty shillings.* Prizes were well distributed, and the exhibits, many of them much better than last year's, provided several difficult problems for the judges. Onions, shallots and runner beans went to the physicians, lettuces to the lady almoner, and root crops—carrots and parsnips—to the senior stoker. The RMO's beetroots were adjudged best of a very full entry; potatoes too were abundant and good, and the prize fell to one of our lady porters, who also carried off the outdoor tomatoes after a terrific contest with the ENT surgeon, who was placed second in this class, winning by a split pip from a representative of the VAD. The dispensary carried off the peas, with a couple of seconds for carrots and beetroots as adjuvants. A little heartburn was felt by the massage department, whose shallots, grown in a very rough plot near the prewar rubbish tip, did not sufficiently overcome this handicap to reach prize-winning standards. Some of us thought that more use *might have been made of physiotherapy to stimulate* these shallots, and likewise the X-ray department's carrots, unkindly dubbed carrotlets by a candid critic. [illegible] en—for the best [illegible] h the collections [illegible] with an attrac-[illegible] f cut onions.

* * *

In the medical room of our Recruiting Board I heard an unseen clerk telephoning: "That you, Tom? 'Ave you got the NS 1 of a bloke named Cyril 'Igginbotham [illegible] says 'e only wants to join the Army to get a gun to blow 'is brains out." Pause. Then. "What's that you say, Tom? Best thing that could 'appen to 'im. Let it go through? OK, Tom. Just as you say."

* * *

Shall we be wise enough to learn the lesson which the EMS hospitals are teaching—that the day of the massive city hospital is over? The ideal unit is the general hospital of simple design, built in country surroundings near the town, and associated with a casualty department in the centre of population. Anyone who dares to build or add to one of the existing "barrack" hospitals in our cities is sinning against the light.

* * *

N[illegible] flash [illegible] free [illegible] was sometimes embarrassing. At a time when not every doctor in this c[illegible]honamide drugs, I [illegible] *be in* Kenya decided [illegible] buy sulphonamides for the treatment of the gonorrhœa said to be prevalent among them. Now, therefore, that penicillin is a household word in medical circles here—though yet very far from a household article—it is somewhat startling to learn that in Switzerland penicillin has apparently only just peeped over the horizon. In a copy of *Médecine et Hygiène* published at Geneva on Aug. 25, there are Exchange messages from London and Washington announcing in a few lines the discovery of penicillin, followed by an editorial note that "We shall keep our readers informed of the new discovery, *should it prove interesting.*" Switzerland was before the war a nodal point for the exchange of medical information, but the old definition of the British Isles as "a piece of land entirely surrounded by sea-sickness" might now be applied, with a difference, to Switzerland.

* * *

I am a shocking correspondent, yet I like to keep in touch with my friends. Consequently it was my habit to write to most of them each New Year's Eve. In these letters I used to browse over all the good things that had happened to me during the last twelve months. And in those wondrous prewar days what glorious things I had to tell each New Year's Eve. Turning up copies of those letters I find that now and awhile, writing to a colleague, I would wax enthusiastic over some new-found point of technique or over some diagnostic difficulty overcome, but most of the space seems to have been devoted to accounts of holidays. Oh! those wonderful holidays, from each one of which I would return vowing it to be the very best of them all, only to find next year that the same thing was true all over again. They would keep me busy night after night during the winter, for I held strongly that a successful holiday must always be a planned holiday, requiring prolonged research with every sort and scale of map, with a guide-book, time-table, and even with prospective menu. For I find in those letters much mention of food, hushed tales of a truffle-stuffed paté in Périgord, of a bouillabaisse eaten on the waterfront at Marseilles, of a wonderful steak that we ate beneath the shadow of the palace at Avignon, a Chateaubriand with the faint smoky flavour of the charcoal fire, of a certain Asti, ice-cold, under the olives above Orta, and of a Montrachet that lured us, bottle after bottle, through a stifling night in Nîmes. Looking over those annual letters, copies of which I kept as a kind of diary, I find mention of so many lovely things, of the bent pines along the old Appian Way outside Rome, as it was before the days of Mussolini, the dark woods above Fiesole, the wild excitement of my first view of the New York skyline, of long days spent with a rucksack in the mountains, of blue sailing days on the Helford river, of Dartmoor in August, where the wind is soft and honeyladen, where the heather is purple like the blood of saints, and of my first sight of Westward Ho! when I went round in "two over" in spite of a caddy who lashed me with his tongue from first tee to last green.

But now that the days bring us neither the leisure nor the will to relax we have "no time to stand and stare." Nor is there time to linger over good food and wine, talking to friends. We can but adopt the attitude of the very old, who exist without hope for the future, with little interest in the present, who can but brood everlastingly over the past. And what memories I have to gloat over—a procession of magnificent holidays of which those letters remind me. They brought me the years that we went to France, walks in the Pyrenees, land of pelota and of folk-dancing, long sundrenched days in Provence, hot sand and shining sea, the occasional before-breakfast bathe from the deserted cove, cool under the early morning haze. Then the Tyrolean years with the mountain inns of the Zillertal, where they dance and sing in the long evenings, and give you "Gruss Gott" as you pass, the wild strawberries and the flowers of the upland valleys, the unforgotten smell of the chalets, blended of wood smoke and cattle and the damp earth, the cold of the woods as we started to climb at dawn, and at night the warmth of the Weinstube where we ate vast meals, Wiener schnitzel and fresh cranberry sauce, and nodded over the beer after long days in the mountains. Then the years that showed me Spain, perhaps the best of them all, that gave me the love of my life, the bull ring, with its magic and beauty, its music and colour and movement, its splendour and bravery beyond belief, Spain and the mountain road that led to Pamplona, the heat of Granada, the fiesta at Seville where first I saw the wonder that was Juan Belmonte. So lovely were those years, and so bitterly do I regret the gladness that life lacks today, that I wonder whether perhaps it would have been better never to have tasted those delights, and whether the old adage that it is better to have loved and lost than never to have loved at all is not a bitter lie.

* * *

It was tactfully pointed out to one of the girls attending the hygiene class that not only should she keep her nails clean on general grounds, but in a hygiene student it was particularly . . . and so on. Next week the ebony rims were gone. "Thanks for the tip," she said to the instructor, "they look much nicer now I use my sister's toothbrush on them."

Public Health

From the Annual Reports

THROUGHOUT Britain the year 1942 was remarkable for its low incidence of infectious diseases and freedom from epidemics. The incidence of measles is a measure of the numbers at risk; its fatality has been reduced enormously. Attacks of whooping-cough appear to be fewer than those of measles in the proportion of two to three, but owing to the difficulty of diagnosis in early childhood, in which whooping-cough is most frequent and most fatal, the true incidence is higher than that recorded and its fatality remains considerable. Few children seem to escape attack by both diseases but everything possible should be done to protect children from contracting these infections before they are three years old. Inoculation promises well for whooping-cough, but it must be done very early in life to cover the period of greatest danger. Diphtheria can of course be rendered practically harmless by immunisation and scarlet fever has ceased of itself to be much more than a nuisance. The epidemic of cerebrospinal fever is waning, but not as rapidly as had been hoped Its fatality can be reduced by treatment to about 10%, but it is doubtful if any preventive measure so far employed influences its incidence. Viewed as a whole the immunity of 1942 from infections has not been explained.

The present distribution of fatalities from diseases which are in theory largely preventable is illustrated in Dr. W. M. Frazer's report for *Liverpool.* In 1942 for every 100,000 population, 35 died from the seven principal zymotics; 97 from pulmonary tuberculosis: 18 from other forms of tuberculosis; 204 from respiratory diseases, and 191 from cancer. In the decade 1871–80 the percentage of total deaths due to infections (less diarrhœa, influenza and tuberculosis) was 19·2; it is now 5. From tuberculosis the percentage has been reduced from 13·5 to 8·3, whilst from cancer it has increased from 1·4 to 13·6. The total crude death-rate is now less than one half what it was 70 years ago. Cancer deaths in Liverpool in 1942 totalled 662 males and 617 females. Female reproductive organs and breasts accounted for 230, but in all other sites, except liver and skin which together caused 22 male and 24 female deaths, males suffered much more heavily than females, most noticeably *in the lungs (147 males and 38 females).* Only one case of poliomyelitis and none of encephalitis lethargica was notified in 1942. There were 5 cases of anthrax, all treated with serum and neoarsphenamine, and all recovered. In a series of 100 cases treated in Liverpool since 1924 there were 7 deaths, but all the last 50 cases recovered though some of these were very severe and in most dangerous sites. Excision was not done in any case. Liverpool keeps a register of known typhoid and paratyphoid excretors. At present there are 8 names on the register, all excretors of *paratyphosum B* and all but one are females. The longest case has lasted for over six years. The number of diphtheria inoculations completed was 27.368, three times as many as in any previous year and more than double the number of births (13,729) registered in the year.

Dr. T. Lloyd Hughes reports epidemic prevalence of bacillary dysentery in *Middlesbrough* with 265 notified cases (organism not stated), of which 258 were admitted to hospital with 12 deaths. Also 40 deaths from infantile diarrhœa occurred in 1942. No medium of spread was discovered; "it was concluded that whatever the source of infection the disease in the main was actually spread by personal contact." Sulphaguanidine was used with success in treatment and for freeing carriers. Diphtheria gave 544 notified cases with 38 deaths, a heavy toll in a population of 140,000. At the clinic for scabies 1275 persons were treated, of whom 1262 were school-children. Arrangements were made to deal elsewhere with adults and you [illegible]

Parliament

FROM THE PRESS GALLERY

Health Services in Coal Mines

OPENING the debate on the coal-mining situation in the House of Commons on Oct. 12 Major G. LLOYD GEORGE, Minister of Fuel and Power, said that progress had been made in the health services during the last year. Provision, long overdue, had been made for the rehabilitation of injured miners. A mines medical officer had been appointed in each region. Inquiry continued into the methods of treating pneumoconiosis and measures for preventing the dust which was its cause had made satisfactory progress. There was now hardly a miner who found it impossible to have some sort of meal at a canteen and for most of them it could be a hot meal. Questioned as to the proportion of miners using the canteens Major Lloyd George admitted that at many canteens the attendance was not very satisfactory. The figures were about 25–30%. From his own experience he knew this had nothing to do with the quality of the food. There was the same sort of difficulty with pit-head baths. He thought we must try to break down this prejudice a little more quickly.

Winding up the debate for the Government on the first day Mr. TOM SMITH, one of the joint parliamentary secretaries and himself an ex-miner, pointed out to his mining friends the progress made in promoting their health, welfare and safety. The Minister had insisted from the beginning that there should be no sacrifice of safety measures in the hustle of war-time production, and the accident-rate had been reduced. This year there had been 542 men and lads killed, a big figure, he admitted, but for the same period last year the figure was 689. Progress had been also made in treating fractures. In 1938 only 1% of these cases were treated by rehabilitation methods; today there were 8 residential centres and facilities were provided in every colliery district. It was good to hear from patients themselves that they were making remarkable progress towards recovery. The Government were very conscious of the problem of workmen's compensation in the mining industry, because for every man injured in a factory six were injured in the pit. A lot was being done to improve the miner's lot and more could be done. But if the collieries were made more attractive and the miners were spared what they went through after the last war Mr. Smith honestly believed that we can find men to work in the pit and give the country the coal it needs both in peace and in war.

QUESTION TIME

Future of Medical Practice

Dr. RUSSELL THOMAS asked the Minister of Health what steps he had taken to ascertain the views of doctors serving in the armed forces both in this country and abroad in regard to the future of medical practice.—Mr. E. BROWN replied: I am alive to the need for this, but the appropriate time will be when the white-paper has been issued as the basis for public discussion. Dr. THOMAS: Is it not a fact that no steps have been taken to ascertain the views of about 30,000 doctors connected with the Armed Forces? Would the Minister give a political assurance and guarantee, similar to that of the Prime Minister yesterday in the case of coal, that the medical profession will be protected? Mr. BROWN: The proper time to deal with that matter will be when the white-paper is issued. The country and the House will then be able to express an opinion.

Dr. EDITH SUMMERSKILL: Are we to understand from the answer that the Minister has taken advice only from the older doctors, and not from the younger ones, who are in the Services, and who will be called upon to administer the medical service?—Mr. BROWN: I have pointed out that the time to deal with these questions will be when the white-paper is before Parliament.

Sir ERNEST GRAHAM-LITTLE asked the Minister whether he was aware that the representative body of the British Medical Association had in 1942 and 1943 recorded almost unanimous opposition to the establishment of any whole-time salaried state medical service to the extinction of private practice, as proposed in assumption B of the Beveridge report; that similar opposition had come from numerous plebiscites of the profession; and whether he still adhered to his declaration at Westminster Hospital, on Oct. 4, that the Government had accepted assumption B and was engaged in putting its provisions into operation.—Mr. E. BROWN replied: The answer to the last part of the question is yes. But assumption B does not contain the proposal described—nor does it purport to deal at all with the method of organising the new service.—Sir E. GRAHAM-LITTLE: Will the Minister contradict the statement which he is said to have made that this matter has been determined already and that it is actually being put into operation?—Mr. BROWN: I have never said that.

Dr. RUSSELL THOMAS: Is the Minister aware that more than 90% of the profession have recently turned down the matter, and that they are particularly disturbed at the Socialistic scheme he brought forward at the outset?—Mr. BROWN: The hon. member is now repeating what he said on the adjournment, with not very great satisfaction to himself.

Mr. W. GALLACHER: Is the Minister aware that the national health service is more important than the opinion of a few private practitioners?—No further reply was given.

Medical Examination of Prospective Employees

Mr. RHYS DAVIES asked the Minister of Labour whether he was aware of the growing practice of employers to engage medical officers to examine prospective employees; that this practice tended to transfer the determination of employment into the hands of the doctors, increased unemployment and must create a pool of permanently unemployed persons especially if the medical fitness required was of a progressively high standard; and if he [illegible] —Mr. ERNEST BEVIN replied: I [illegible] the greater use of doctors' serv[illegible] ments in the interest of the medical welfare of the employees. I have no evidence that this is leading to the imposition of unnecessarily high standards of physical fitness in prospective employees. Mr. DAVIES: Will the Minister inquire whether pressure is brought to bear on employers by the premium insurance companies dealing with workmen's compensation, so as to avoid compensation risks by throwing out certain persons who would otherwise be eligible for employment?—Mr. BEVIN: I could not undertake an inquiry at this stage.

Mr. J. J. TINKER: What steps does the Minister take if a man does not pass a doctor to provide suitable employment?—Mr. BEVIN: If a man passes out through injury or is unsuitable to go back into employment I take him over immediately for training for some other employment.

Regulation 33B

Replying to Mr. GRAHAM WHITE, Mr. BROWN said that regulation 33B is substantially helping local authorities to get into touch with persons suffering from venereal disease and to induce them to undertake treatment. Up to June 30 last 1893 cases were brought to the notice of medical officers of health in this way. The number of cases reported more than once as alleged sources of infection was 110. In 3 cases it was necessary to take proceedings for failure to carry out treatment.

Dr. SUMMERSKILL: In view of the fact that only 6 men had been reported under regulation 33B, is the Minister satisfied that this regulation is making a satisfactory contribution to the reducing of the incidence of venereal disease?—Mr. BROWN: I would say that it is making a very useful contribution.

Diphtheria Notifications

Returns from local authorities in England and Wales between Jan. 1, 1940, and June 30, 1943, show that among approximately 107,000 children who were notified during those periods as suffering from diphtheria approximately 9500 in the aggregate had completed the course of immunisation. The returns for the year 1942 show that among approximately 1530 children known by local authorities to have died from diphtheria in that period 41 had completed the course of immunisation. The corresponding provisional figures for the first six months of 1943 are 600 and 21. (Mr. BROWN replying to Mr. S. V. VIANT.)

Miniature Radiography Units

Miniature radiography units have now been supplied in England to the county councils of London, Lancashire, Middlesex and Surrey, and to the Staffordshire, Wolverhampton and Dudley Joint Tuberculosis Board. Another unit has gone to Scotland, and one is on the point of delivery to the Welsh National Memorial Association. (Mr. BROWN replying to Captain L. F. PLUGGE.)

Dried Milk in Flour

Mr. T. LEVY asked the Parliamentary Secretary to the Ministry of Food for what reason millers were required to incorporate ¾% of dried milk in the flour they produced.—Mr. W. MABANE replied: The fortification of flour with dried milk was introduced as an important means of ensuring that valuable nutrients reached persons needing them most.

Typhus among the Troops

Sir JAMES GRIGG, replying to a question, stated that during the last typhus season in North Africa there were 20 cases among British troops, of which 6 were fatal. Operations in Sicily occurred in the summer months and no cases have been reported from this area during the period. Some 30 cases of typhoid fever have been reported from North Africa.

Hospital Accommodation in Africa

In answer to a question Mr. P. V. EMRYS-EVANS said: The numbers of beds available for Africans in Government hospitals in the High Commission Territories are: Basutoland 254, the Bechuanaland Protectorate 128 and Swaziland 44. The ratio of beds to population is 1 : 2600 in Basutoland, 1 : 2076 in the Bechuanaland Protectorate and 1 : 3483 in Swaziland. If the beds available in the mission hospitals, most of which are Government grant-aided, are included, the ratios are 1 : 2000, 1 : 1067 and 1 : 1783 respectivly.

Facilities for treating Leprosy

Sir E. GRAHAM-LITTLE asked the Parliamentary Secretary to the Ministry of War Transport whether he was aware that the Universities Mission to Central Africa had been frustrated in the treatment of leprosy by the lack of essential drugs from India, which were held up by shipping restrictions, resulting last year in the closure for from 4 to 7 months of all centres conducted by the mission for treatment, with serious consequences for large numbers of patients; and whether he would take steps to relieve this position.—Mr. P. J. NOEL-BAKER replied: I understand the drug in question is hydnocarpus oil, supplies of which have hitherto been obtained by the mission from local medical officers in Tanganyika Territory. Recent inquiries addressed to Tanganyika Territory show that supplies of this oil are being received from India and are now adequate. I have no information in support of the suggestion that the difficulties last year were due to shipping.

Mr. D. N. PRITT asked the Secretary of State for the Colonies whether he had considered the report of the Cyprus trade-union delegation on the Leper Institution at Nicosia, stating that there was inadequate hospital and medical staff, insufficient supplies of sera, baths and other medical necessities, rice, oranges, eggs and milk; insufficient cash allowances to feed and clothe patients; that blind leprous patients suffered plagues of flies through absence of swing doors; that the guards put patients to hard labour and sold them food and other essentials at black-market prices; that there was no electric light, the cinema was used as a store and patients were not allowed to have a representative committee to put forward their requests and complaints; and what action he was taking in the matter.—Mr. EMRYS-EVANS replied: The Governor of Cyprus has been asked for a report on this subject.

Letters to the Editor

THE HEALING EDGE

SIR,—Your leading article of Oct. 9 on the fate of skin homoplasts ended with a reference to the work of V. B. Wigglesworth on epithelial healing by migration or sliding of cells from the edges of the wound, with mitotic division some distance from the wound to make up for the resultant thinning. Last year Dr. Pullinger and I called attention (*Proc. Roy. Soc. Med.* 1942, 35, 229) to the fact that this sliding of epithelial cells to cover a defect could be readily seen in pigmented rabbits after destruction of a portion of the corneal epithelium. These rabbits have pigment in the epithelium of the corneoscleral junction and the amount of sliding is easily demonstrated by the rapid movement of this pigmented edge on to the cornea to cover the defect. This fact was known to ophthalmologists and pathologists in 1898, but often seems to be ignored now. It is being studied in greater detail in this laboratory at the present time.

Wigglesworth's paper is a brilliant exposition of the process in the skin of an insect. [illegible] stimulus for migration is a produ[illegible] while the stimulus for mitosis [illegible] wound is the resultant stretching [illegible] by the migration. He points ou[illegible] more effective in producing migration than is injury by heat and considers that heat destroys the stimulating substance. In some cases after burns of the skin he produced mitoses at the edge instead of migration and hence slower healing.

I am fully in agreement with your leader that future work on healing skin and of grafts should include investigation of the position of the mitoses and the presence or absence of migration. It seems that just now when wound healing is such a live subject many workers are ignoring these curious facts.

Oxford. IDA MANN.

THROMBOCYTOPENIC PURPURA

THE IMPORTANCE OF SPLENCULI

SIR,—In their comprehensive and instructive article Dr. Evans and Dr. Perry have done much to clarify certain points in the ætiology and management of these very difficult cases. Is the spleen ever enlarged in essential or primary thrombocytopenic purpura? Their statement that "the spleen is not as a rule greatly enlarged; sometimes it is palpable, but usually not" calls for comment. In my series of 18 cases (Maingot, R. Abdominal Operations, London, 1940, p. 504), in which the diagnosis appeared to be irrefutable, the spleen was carefully examined and weighed as soon as it was removed from the body.

In all these cases it was found to be of normal size, of normal consistency and structure, and of average weight; in fact, each seemed to conform to the average healthy type o spleen. The immediate and late results in this small series were on the whole satisfactory, as 15 are alive and well today some many years after splenectomy; 1 died of pulmonary tuberculosis two years after operation; 1 has slight recurrent hæmorrhages but is at work; and 1 succumbed from shock within a few hours of operation. Where an accessory splee or splenculi were found, these were excised. In this group of 15 cases which were cured by splenectomy are 5 cases which were carefully followed up and reported by Dr. B. Myers (*Brit. med. J.* 1935, ii, 445 and 1942, ii, 466).

In 3 other cases, diagnosed and referred to me as instances of essential thrombocytopenic purpura hæmorrhagica th spleen was palpable before operation, and on being weighe after removal was found in each instance to be about doubl the normal weight for the age and size of the patient. Operation in each of these cases was a complete failure, and i the light of subsequent investigations these were obviousl instances of secondary purpura hæmorrhagica. Personally would not advocate splenectomy for a suspected case o thrombocytopenic purpura if the spleen can be felt below th costal margin.

It will be noted that in many of the cases which died or in which the symptoms recurred after splenectomy, a accessory spleen or splenculi were found at operation. Alexander and Romanes (*Lancet*, 1929, ii, 21) conten that if the spleen is functionally or structurally deficien there is a compensatory hyperplasia of accessory splenic tissue. Hence, it is of the utmost importance during operation to search for and to excise accessory spleens whenever this proves feasible. The exception to this rule, of course, would be rupture of the organ, which naturally demands excision. In any case of essential thrombocytopenic purpura, or of acholuric jaundice (whether this be acquired or familial in type) where symptoms recur after removal of the spleen, the possibility of regeneration of an accessory spleen or of maleficent hyperplasia of splenculi should be borne in mind. It may even be advisable in certain recurrent cases to reopen the abdomen and to make methodical search by sight and by touch for cryptic remnants of splenic tissue, and if these are found and are capable of total ablation, this should be performed.

Milroy Paul (*Lancet*, 1937, ii, 74) classifies true accessory spleen into two types: in the first, the accessory spleen is a constricted part of the main spleen, to which it is bound by a band of fibrous tissue; in the second it is a distinct and separate mass.

E. B. Settle (*Amer. J. Surg.* 1940, 50, 22) states that an accessory spleen or splenculi are present in 10–35 per cent. of all autopsies, and in individual cases the number of these varies from one or two to one thousand. These accessory spleens may be found: (1) near the hilum of the spleen; (2) in the gastrosplenic omentum (the commonest site); (3) in the splenocolic ligament; (4) in the great omentum; (5) beneath the peritoneal tissue along the course of the splenic *artery and vein; (6) on the anterior surface of the pancreas*, or (7) elsewhere in the peritoneal cavity.

Dr. Evans and Dr. Perry were obviously aware of the risk of recurrence associated with leaving these remnants
[illegible] statements as "one died later,
[illegible] perplasia of the accessory
[illegible] ot removed" and again
"one case where it (splenectomy) failed, many splenculi
were presen[illegible] In their summary,
however, it [illegible] wiser had they laid
emphasis up[illegible] these bodies play
in so far as prognosis is concerned following removal of the spleen for this disease.

Wimpole Street, W.1. RODNEY MAINGOT.

NOT SO DREARY

SIR,—The distressingly dreary story of a municipal hospital by your peripatetic correspondent of Oct. 9 would have been perfectly true here ten years ago, and
yet under an enlightened [illegible]
veloped into a large mc[illegible]
inpatients and with over [illegible]
yearly. The special featu[illegible]

1. Attractive colourful wards and outpatient department.

[illegible] ng has been refused

5. A [illegible] alified specialists (normally [illegible]
6. N[illegible]
7. Provision of specialised units for treatment and [illegible] respiratory, dietetic, genito-[illegible]
8. [illegible] es Good convalescent home facilities. Occupational therapist.
9. Practical encouragement of research. Good reference library and forty medical journals. Liberal staffing of large modern pathological department. Full-time medical artist.
10. Provision for consultation with eminent authorities when necessary.

We are not unique, for there are already a number of municipal hospitals emerging from poor-law institutions into modern hospitals along these lines. There seems no doubt the hospital services in the country need expansion, and if this trend were accelerated many of the present deficiences would disappear. It is essential for all local authorities (if necessary with financial assistance) to strive vigorously to provide "good service" for their population. The competition of an expanded municipal service would probably obliterate many of the small and therefore inefficient voluntary units, leaving only those whose tradition and efficiency would continue to provide competition for us and stimulation for all.

Your correspondent comments on the fetish of municipal forms. Unfortunately, in the past, all public authorities have had to protect themselves with a heavy defensive armour (of forms and records) against the ready criticism flung by the public against their own rate-paid institutions. Like other heavily armoured bodies their *movements have been slow and their clumsiness* great. As the public gain confidence in their institutions they can gradually divest themselves of their protective clothing of bureaucracy and speed ahead.

Central Middlesex County
Hospital, N.W.10. F. AVERY JONES.

CONDITIONS OF MEDICAL SERVICE

SIR,—At a meeting on Oct. 3 of the undersigned eleven doctors, nine of whom are general practitioners in Birmingham, the future of medical practice was discussed and the following points unanimously agreed to as being of fundamental importance both to doctors and the community.

1. *It is of vital importance for the British Medical Association* to give guidance to the Government by formulating a plan for any future salaried State Medical Service, and in particular it is of the utmost importance to settle in advance the question of salary in such a service. The meeting considered that a salary (based on prewar figures) starting at £500 a year and rising to £2000 would be acceptable to the vast majority of the profession.
2. To maintain the high standard of the general practitioner and to avoid the tendency for over-specialisation it was proposed that the salary of the specialist should not be higher than that attainable by the general practitioner by virtue of experience or higher qualifications.
3. As a safeguard against bureaucracy (*a*) administrative posts shall not command a higher salary than equivalent clinical posts; (*b*) no doctor in the service shall be deprived of his rights as a citizen—e g, to stand for membership of local councils.
4. The health centre will regain for the general practitioner the stimulating atmosphere of his medical student days, and medical practice will be based on collaboration and cooperation with colleagues no longer in competition, and free from commercialism.
5. T[illegible] lack of incen-[illegible] clinicians [illegible] s cited as
6. [illegible] will be limited only in the interests of the patient—e.g., by limitation of lists and geographical considerations.

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[illegible] y all
[illegible] who
[illegible] for

MARY H. BARROW. S. LEWIN.
C. C. BRADSWORTH. A. MARKSON.
R. C. L. BURGES. J. A. SCOTT.
URSULA COX. H. M. TURNBULL.
J. VERNON GRIFFITHS. A. WISEMAN.
Birmingham. B. HERBERT.

MYASTHENIA GRAVIS

SIR,—Recognition of thymic abnormality in about half the patients suffering from myasthenia gravis has suggested treatment by irradiation or excision of the thymus. Both methods have given encouraging results occasionally, but it is only four years ago that the report by Blalock et al. (*Ann. Surg.* 1939, 110, 544) revived interest in the operation and was followed by numerous further thymectomies in the United States and in this country. Improvement, and sometimes apparent cure, has been the result in about a third of the published cases. The complete failure in the remaining patients remains unexplained. The age of the patient, the severity and duration of the disease, and the histology of the thymus give no clue to prognosis.

The explanation that failure is due to insufficient removal of thymic tissue is unacceptable. In many of the failures large and apparently complete glands have been removed. If we concede that small fragments may have been overlooked, we should still expect considerable temporary improvement, as in thyrotoxicosis after inadequate thyroidectomy.

I suggest that improvement might well be due not to thymectomy, but to the accidental removal of parathyroids in some patients. This would set up a state of latent tetany, counteracting the myasthenia. The favourable action of large doses of guanidine shows that tetany corrects the myoneural disorder of myasthenia. The well-known anatomical aberrations of the parathyroids, which may be found in the thymus and at other sites in the mediastinum and at the base of the neck, exposes them to injury or removal in some patients during thymectomy.

If this suggestion is correct, the serum calcium should be low in the patients who improve, and within the normal range when the operation fails. As I am unlikely to have an adequate number of patients to test this hypothesis, I bring it to the notice of those who have suitable opportunities. If investigation confirms my suggestion deliberate parathyroidectomy should obviously supersede thymectomy in the treatment of myasthenia gravis.

Basingstoke. L. P. E. LAURENT.

RELIGIO MEDICI

SIR,—In Dr. Douglas Guthrie's excellent and informative tercentenary tribute (in your issue of Oct. 9) to the author of the first "Religio Medici" there are two points on which I would like to comment.

Firstly, Dr. Guthrie states that the book was translated into several languages including Italian. It is true that in a letter to the antiquary, John Aubrey, dated 14 March, 1672–3, Sir Thomas Browne stated that he "writt *Religio Medici* in English, which was since translated into Latin, French, Italian, High and Low Dutch." But up to the present time no contemporary edition in Italian has ever been seen, and it seems that Browne was himself under a misapprehension about this. The statement did not, in fact, become true until the appearance of Professor Piccoli's translation in 1931.

Secondly, Dr. Guthrie states that "of the closing years of Browne's life we have little information." This appears to me to be the very opposite of the truth. The later years of Browne's life are much more fully documented than any other period by the voluminous and interesting correspondence which has survived. Most of the letters are addressed to his son, Dr. Edward Browne, FRS, and they provide a detailed picture of Browne pursuing his medical practice and scientific interests in Norwich.

London, N.W.3. GEOFFREY KEYNES.

THE SIZE OF INFLUENZA A VIRUS

SIR,—In the kindly notice of my Pelican book *Beyond the Microscope*, in your issue of Oct. 2, you stigmatise as "rash" my acceptance as "an established fact" of the American estimate of 15 mμ as the diameter of the influenza virus particle, against the English estimate of 100 mμ. May I, as briefly as possible, attempt to justify my apparent rashness?

The two most recent American papers on the size of the influenza virus particle are those by Chambers and Henle (*J. exp. Med.* 1943, 77, 251) and Chambers, Henle, Lauffer and Anderson (*Ibid*, p. 265) and I quote freely from them. It would, I think, be agreed that the presence of cell components in a virus preparation casts doubt on all measurements of virus particle size unless the possibility of adsorption of virus on the larger particles is eliminated. Now the English work on the size of influenza virus was carried out on mouse-lung tissue and the American work on mouse-lung tissue and the extra-embryonic fluids of chicks. The following are the relevant facts:

1. Both infected and normal mouse lung tissue contain particles of 100 mμ.
2. The infectious unit from tissue suspensions is about 100 mμ in diameter and is of the same chemical composition as particles of the same size and abundance separated from normal tissue by an identical procedure.
3. Particles 100 mμ in diameter separated from normal lung tissue can adsorb the virus completely from the egg fluid and thereby acquire the infective property. Moreover the antigenic properties of the particles from infected lung extracts are similar to those of the normal lung particles and differ only in the superimposition of the antigenic structure of the virus as it occurs in chick allantoic fluid.
4. Extra-embryonic fluid of chicks infected with the virus of influenza A contained the virus in high concentration, but the virus frequently could not be sedimented from such fluid by speeds which would remove all virus activity from mouse-lung filtrates. These authors spun a mixture of tobacco-mosaic virus and influenza virus from allantoic fluid and found that while the tobacco-mosaic virus was almost completely sedimented under their conditions, about half the influenza virus actively remained in the supernatant. Tobacco-mosaic virus sediments with about the same velocity as a spherical particle of 50 mμ of the same density as most viruses.
5. Ultrasonic vibrations increased the infectivity of lung-tissue sediments by 10–30 fold, thus suggesting that aggregates were being broken up by this means.
6. The infectivity of some of Chambers and Henle's preparations was such that if the infective units were 100 mμ in diameter, infection could be obtained with considerably less than one particle.
7. Electron micrographs of the isolated virus protein indicate that the predominating unit is roughly spherical in shape and has a particle diameter of about 11 mμ.

It seems to me that this evidence is at least as good as much of that which supports the estimates of other virus sizes accepted as established facts.

Plant Virus Research Station,
Cambridge. KENNETH M. SMITH.

TREATMENT OF BURNS AT FIRST-AID POSTS

SIR,—Would it not be wise to insist on the masking of all dressers who treat burns at first-aid posts? In your issue of May 29 Leonard Colebrook describes a case from whose burn hæmolytic streptococci were cultivated four hours after it was sustained. Masking of all attendants on this case might well have prevented the infection and resultant delay in healing. Recently I had the chance of hearing of a community of 120 who had nose and throat swabs taken. No less than 70 of these were carriers; all were feeling healthy and carrying out their routine duties. A burn case attended by one of these 70 would probably have been infected. The masking of all nurses attending confinements is no longer an innovation. It is a routine standard to ensure a satisfactory puerperium. No-one need suggest the old bogy of frightening the patient; it just does not exist. In my opinion all first-aiders and all dressers and nurses in the hospital casualty departments should automatically mask before attending to burns.

Smethwick. C. KIRBY.

CHILLED KAOLIN POULTICE

SIR,—From time to time methods of treatment are described which involve the local application of low temperatures.[1] I would suggest that some attention should be paid to the value of the local application of *chilled* kaolin poultices, as this preparation will maintain a low temperature over a long period in the same way that it will maintain a high temperature. The details of the method are as follows:

Kaolin poultice is spread on lint to an even thickness of a quarter of an inch. The exposed surface is covered with a layer of gauze to obviate sticking. Three such "cold poultices" are prepared and cut to shape. They are packed in large envelopes or flat X-ray film tins and are chilled in a domestic refrigerator. The poultices are applied one at a time, and are held in place by bandage over a thick layer of cotton-wool. Each is left on until it no longer feels cold; it is then replaced by a newly chilled one and the discarded one is repacked in its tin or envelope and returned to the refrigerator for re-chilling.

This method is described with some diffidence as its use is limited to certain definite indications. But I have used "cold kaolin" since 1938 and am convinced of its value as a simple and easily available means of obtaining a local application of low temperature over a long period.

W. S. PARKER.

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[1] Ungley, C. C. *Lancet*, 1943, i, 681; Allen, F. M. *Ibid*, p. 723

Obituary

ANGUS MACDONALD

MB EDIN; LIEUT-COLONEL RAMC

Colonel Angus Macdonald was killed in Tunisia in May by a shell-burst as he drew up in his car outside one of his advanced dressing-stations.

Vandyk

He was educated at Merchiston Castle School, and following in the footsteps of his father and grandfather he qualified in medicine at the University of Edinburgh in 1930. After holding a resident appointment at Guildford Hospital he joined the RAMC the next year and was posted to India. He served at Lahore for a little over a year as staff surgeon and medical officer to the NW Railway, and in 1933 he was sent to Burma, returning to this country at the end of his foreign tour in 1936. For a time he was medical officer to the garrison at Loch Swilly, then occupied by the British, but in 1937 he came to London to attend the senior officers' course at Millbank, was selected to specialise in pathology, and in due course appointed DADP to the Northern Command. After a few months he was sent to Cambridge where he studied physiology and the pathology of chemical warfare under Sir Joseph Barcroft, before joining the staff of the Gas Establishment. On the outbreak of war Macdonald went to France and was attached to GHQ, but early in 1941 he transferred to a field ambulance and was soon promoted to the command of one. The following year he was sent to the Middle East and after serving in various places arrived with his ambulance in Tunisia during the final battle of the campaign. A colleague who had served with him in different parts of the world writes:

Angus Macdonald was popular wherever he went, for he loved humanity, and had great personal charm. He was a sound doctor, well-informed, practical, and conscientious, but it was the command of a medical unit on active service which gave him his opportunity. His happy, understanding disposition enabled him to maintain his unit at the highest pitch of efficiency, yet contrive to make the lot of everyone who served under him as pleasant as circumstances allowed. His type is only too rare, and he can ill be spared.

While he was in Burma Colonel Macdonald married Miss Dorothy Goodban and he leaves her with two sons.

CHARLES RYAN

MB DUBL; MAJOR RAMC

Vandyk

Major Charles Ryan, who was reported missing, believed killed, at sea during September, was the youngest son of the late Dr. J. F. Ryan. He was educated in Ireland and qualified from Trinity College, Dublin, in 1931. The following year, on his father's death, he took over part of the family practice at Loughrea in co. Galway. Three years later he joined the RAMC with a short-service commission and served in Egypt, Palestine, Singapore and Shanghai. He returned to England at the beginning of 1940 and since then had been posted to hospital carriers. In 1939 he married Miss Susan Battock, and they had one son.

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months' preliminary course in a West Indian hospital to test their fitness for nursing. The plan will be reviewed at the end of twelve months.

Notes and News

THE VOICE OF THE ORACLE

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least one of his predecessors he does not condemn Linacre as a slave to the authority of Galen, but considers that as a

ments on which many scientific facts accepted by the civilised world are based are not generally known: they are accepted on the word of authority. The average doctor could not prove by experiment that the cardiac rhythm is controlled by nervous impulses; he accepts the proposition because authorities inform him that there is convincing evidence of its truth. Authority therefore has an undoubted value in education. It is only when authority seeks to establish an absolute despotism that men revolt and revile it. Shakespeare knew all about that aspect of the controversy.

> And art made tongue-tied by authority,
> And folly (doctor-like) controlling skill,
> And simple truth miscalled simplicity,
> And captive good attending captain ill. . . .

When this occurs men who delight to use their brains kick against the trammels of authority and push their enmity and abuse so far as to deny it any virtues whatsoever. Professor Greenwood explores some of the aspects of this ancient dispute and in doing so incidentally pays high tribute to the late Walter Fletcher who exercised a wise and beneficent authority on medical research in this country. The lecture is not always easy reading, and those who were fortunate enough to hear its delivery will be glad to revive their recollection of some of the argument.

TAKING LESS PAINS WITH OUR SUMS

The reader of Mr. Sawyer's book[2] will not emerge from its pages an accomplished mathematician—that would be asking too much for ninepence—but he will certainly have had more than ninepennyworth of delight. The author's main object has been to dispel the fear of mathematics, whose difficulties to so many of us lie, he believes, in its presentation as something quite apart from everyday life. An endless procession of meaningless signs, words and rules which fails to arouse the

coupled with the endless patience necessary to be sure that it is clear, takes him quite a long way, even if all the fears and difficulties cannot be banished. Textbooks are written, he says, for people who already possess a strong desire to study mathematics; they are not written to create such a desire. In the younger generation his own book should actively help to create it. The older will at least read much of it with pleasure and think wistfully of what they might have done if only they had had a Mr. Sawyer as a teacher.

AN AMERICAN NURSING ACT

Congress, by passing a special act, has established the United States Cadet Nurse Corps. The act arranges for grants-in-aid to be made to nursing schools, which will relieve the student nurse from the tuition fees and personal expenses which she normally has herself to meet in America.

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standards of nursing education, and speeding up of the curriculum. Cadet nurses must undertake to continue in military or essential civilian nursing for the duration of the war. They will receive full tuition, uniform, and a small regular monthly stipend, so that no girl will be deterred by financial considerations from undertaking nursing. It is hoped that the act will help to provide the 65,000 student nurses now needed in American schools.

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1. Authority in Medicine: Old and New. Major Greenwood, D SC, FRCP, FRS (Cambridge University Press. Pp. 32. 1s. 6d.)
2. Mathematicians Delight. W. W. Sawyer, assistant lecturer in mathematics, Manchester University. Penguin Books. Pp. 209. 9d.

Royal College of Surgeons of England

At a meeting of the council of the college Sir Alfred Webb-Johnson, the president, read Mr. W. H. Collins's letter (see p. 520) announcing his gift of £100,000 for the endowment of the department of pathology and the institution of a chair of human and comparative pathology. The council decided to reopen the Bernhard Baron research laboratories as soon as they can be reconditioned.

The Blane medal was awarded to Surgeon-Commander D. P. Gurd, RN, for his investigation into the incidence of trachoma in the Maltese Islands. Dr. F. K. Sanders was reappointed a Leverhulme scholar for a second year. The following appointments have been made by the Mackenzie-Mackinnon research fund committee of the Royal Colleges of Physicians and Surgeons:

Mr. G. H. Bourne, D SC. (Oxford) (reappointed). On the comparative histology of the mammalian adrenal gland; and the rôle of vitamin C in the regeneration of bone, with special reference to the acceleration of the healing of fractures.

Miss Jean Dollar, MS (Royal Eye Hospital). An investigation into the value of cockerel serum in ophthalmic surgery, with especial reference to its use in connexion with mucosal and corneal grafts.

Miss Shirley Draycott (Royal College of Surgeons). The effect of the administration of sulphydryl amino-acids on the antisyphilitic action of arsphenamides.

A diploma of fellowship was granted to F. H. Masina (Camb. and St. Bart's) and diplomas of membership to C. O. Fung-Kee-Fung, R. N. G. Holloway, L. Howell, P. H. Huggill, J. A. Loveless, R. G. May, A. D. Payne, M. I. Pott, N. H. Seaton and B. A. Ward. Diplomas in child health were granted jointly with the Royal College of Physicians to the following:

Patience E. Barclay, Monica M. Bird, J. P. Bound, Annie E. Burns, Cecil M. Drillien, Margaret Egan, H. V. L. Finlay, Cecilia Henry, Leo Hornung, Margaret M. P. Jolly, F. L. King Lewis, F. G. Leslie, Kathleen B. McClintock, Rosaleen De C. McCormick, Mary H. M. Snape, Cecilia V. Urquhart, Fanny D. Wride, and H. J. Young.

Mr. H. S. Souttar will deliver the Bradshaw lecture on Thursday, Nov. 11, at 3.15 PM. He will speak on physics and the surgeon.

Medical Honours

The following awards have been made to RAMC officers for gallant and distinguished service in the Middle East:

CBE (military division).—Brigadier W. D. D. Small, MD EDIN.

DSO.—Lieut.-Colonel L. T. Furnivall, MRCS, and Lieut.-Colonel R. McI. Gordon, DFC, MB GLASG.

OBE (military division).—Lieut.-Colonel D. M. Blair, MB EDIN., Lieut.-Colonel R. H. Bland, MD DUBL., Lieut.-Colonel Ernest Bulmer, MD EDIN., Major A. L. Chute, RCAMC (attached RAMC), Lieut.-Colonel J. B. S. Guy, MB DURH., Lieut.-Colonel T. D. Phelan, MB NUI.

MBE (military division).—Captain H. C. Allan, MB EDIN., Captain K. G.-A. Barlow, MB SHEFF., Major A. K. Borland, MRCS, Major D. MacL. Douglas, FRCS, Major M. H. Evans, BM OXFD, Captain A. M. Lester, MB CAMB., Major P. J. May, MB NUI, Captain G. B. Northcroft, MRCS, Captain K. R. D. Porter, MRCS, and the late Captain A. F. Smith, BM OXFD.

MC.—Captain R. G. MacLeod, MB GLASG., Captain A. D. Parsons, MB LOND., Captain M. J. Pleydell, MB LOND., Captain J. W. Taylor, MB, and Captain C. W. Warner, MB LPOOL.

Eugenics Society

On Tuesday, Oct. 26, at 5.30 PM Dr. A. Spencer Paterson will address the society on the size of the family of the business, professional and titled classes. Lord Horder is to be in the chair and the meeting is to be held at the rooms of the Royal Society, Burlington House, Piccadilly, London, W.1.

Leicester Christian Medical Association

At a meeting of medical practitioners held in Leicester it was decided to form this association, under the chairmanship of Dr. J. V. C. Braithwaite, with the object of "promoting the profession and practice of Christianity among the medical men and women resident in the city of Leicester and counties of Leicestershire and Rutland." Any medical man or woman in the area who accepts the Christian Faith is eligible for membership and forty have already joined. The Bishop of Leicester, the Very Rev. Father Prior, and the president of the Free Church Council have become honorary members, and two associate members from each of the three denominations have been appointed from among the clergy. Further particulars may be had from Dr. E. K. Macdonald, the hon. secretary, 24, Halford Street, Leicester.

[illegible]

British Orthopædic Association

The annual meeting of the association will be held at 1, Wimpole Street, London, W.1, on Friday and Saturday, Oct. 29 and 30. At 9.15 AM on Friday short papers will be read on lesions of articular cartilage of the patella, fractures involving the knee-joint, and injuries of the astragalus. Mr. G. R. Girdlestone will give his presidential address. At 2 PM Mr. G. Gomme of the Ministry of Labour, Mr. William Gissane and Colonel R. L. Diveley, USAMC, will discuss various aspects of rehabilitation, and cine films will be shown. At 10.15 AM on Saturday there will be papers on gunshot wounds of the elbow-joint, surgery in Russia, and poliomyelitis in Malta.

Infectious Disease in England and Wales

WEEK ENDED OCT. 9

Notifications.—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 3249; whooping-cough, 1481; diphtheria, 732; paratyphoid, 8; typhoid, 9; measles (excluding rubella), 581; pneumonia (primary or influenzal), 557; puerperal pyrexia, 159; cerebrospinal fever, 30; poliomyelitis, 15; polio-encephalitis, 1; encephalitis lethargica, 1; dysentery, 263; ophthalmia neonatorum, 70. No case of cholera, plague or typhus fever was notified during the week.

The number of civilian and service sick in the Infectious Hospitals of the London County Council on Oct. 6 was 1977. During the previous week the following cases were admitted: scarlet fever, 262; diphtheria, 39; measles, 14; whooping-cough, 35.

Deaths.—In 126 great towns there were no deaths from measles or enteric fever, 1 (0) from scarlet fever, 11 (2) from whooping-cough, 9 (1) from diphtheria, 46 (6) from diarrhœa and enteritis under two years, and 14 (1) from influenza. The figures in parentheses are those for London itself.

Birmingham and West Bromwich each reported 5 fatal cases of diarrhœa.

The number of stillbirths notified during the week was 190 (corresponding to a rate of 29 per thousand total births), including 27 in London.

Appointments

The following examining factory surgeons have been appointed:

EWING, J., for Whitchurch, Hants;
OWEN, C. G., MRCS, for Stone, Staffs;
WOODLAND, F. A. J., MRCS, for Gunnislake, Cornwall;
BENSON, G. E. M., BM, surgeon lieut.-commander RNVR;
LANNY, JOHN, LRCPE, surgeon lieutenant RNVR;
RUSSELL, RONALD, MB DURH., surgeon commander RN.

Births, Marriages and Deaths

BIRTHS

FITZGERALD O'CONNOR.—On Oct. 12, the wife of Captain G. Fitzgerald O'Connor, RAMC, of Hednesford, Staffs—a son.

HAMILTON PATERSON.—On Oct. 8, at Oxford, to Dr. Ursula Hamilton Paterson (*née* im Thurn), the wife of Captain J. Hamilton Paterson, RAMC—a daughter.

KEIGHLEY.—On Oct. 12, at Dewsbury, Yorks, the wife of Major Robert Keighley, RAMC—a son.

LEISHMAN.—On Oct. 12, the wife of Dr. Hugh Leishman, of Alresford, Hants—a daughter.

MATTHEW.—On Oct. 10, the wife of Dr. P. C. Matthew, St. Ives Cornwall—a son.

MARRIAGES

MACKAY—HARGER.—On Oct. 10, Gordon Cameron MacKay, MB, RAMC, of Pontllanfraith, Mon., to Beryl Arden Harger, of Bournemouth.

MACLURE—MACFARLANE.—On Oct. 12, at Glasgow, William Alastair Maclure, surgeon lieutenant RNVR, to Agnes Macfarlane, of Lincoln.

NEWMAN—BASSET.—On Oct. 7, at Foxearth, Philip Harker Newman, DSO, MC, major RAMC, to Elizabeth Ann Basset, QAIMNSR.

TIBBS—O'MEARA.—On Oct. 9, in London, David John Tibbs, lieutenant RAMC, to Patricia Jean O'Meara.

DEATHS

ADDERLEY.—On Sept. 27, at Ladysmith, South Africa, Arthur Charles Adderley, DSO, LRCPE, lieut.-colonel RAMC retd., aged 70.

HAMMOND.—On Oct. 11, at Salisbury, Charles Francis Dyer Hammond, MB GLASG., aged 61.

POWELL.—On Oct. 7, at Bristol, John Joseph Powell, MD LOND.

ROBERTSON.—On Oct. 6, at St. Mary Cray, Kent, Hugo Given Robertson, OBE, MB GLASG., lieut.-colonel RAMC retd., aged 59.

ROWNTREE.—On Oct. 14, at East Grinstead, Cecil Rowntree, MB LOND., FRCS.

THE PHYSICIAN IN WAR
IN HARVEY'S TIME AND AFTER[1]

W E HUME, CMG, MD CAMB, FRCP
EMERITUS PROFESSOR OF MEDICINE, UNIVERSITY OF DURHAM,
PHYSICIAN, GENERAL HOSPITAL, NEWCASTLE ON TYNE,
HON COLONEL RAMC TA (50TH DIV)

BORN in the reign of Elizabeth, in 1578, 10 years old at the time of [illegible] was a spectator of English [illegible] nths of the death of Oliver C[illegible] As physician to Charles I—appointed in 1630—he was brought face to face with war, and we know that he was present at the battle of Edgehill There is no record that he attended the wounded on any field of battle, but he was interested in the case of Adrian Scrope who received 19 wounds at Edgehill, recovered and lived 13 more years Both in his journeys to the North and during any battle at which he was present Charles I had physicians attached to him and his Court, of whom Harvey was one This militant period of Harvey s life seems a fitting reason for commemorating today the work of physicians in war in Harvey's time and after it, when so many of our College are engrossed in duties in the various Services at home and abroad.

Before the outbreak of the Civil War the vacillating King went to Scotland on four occasions (1633 1639, 1641 and 1646) and it is certain that Harvey accompanied him on the first three (Terry) Thus in 1633 Harvey applied for leave of absence from St Bartholomew's Hospital to accompany the King when he was crowned at Holyrood on June 18, 1633 After an interval of 6 years Harvey again accompanied Charles when he went north to mobilise his forces against the Scots In February, 1639, a Scottish army under Alexander Leslie was massing on the border near Berwick and towards the end of April Charles reached Durham We can presume that Harvey attended divine worship with the royal party in Durham Cathedral on Sunday, May 5, 1639, when Bishop Morton preached from the appropriate text ' Let every soul be subject to the higher powers " Charles remained in Newcastle till May 23, collecting and reviewing his motley troops, and reached Berwick on May 24, 1639 The Pacification of Berwick " was completed on June 24, 1639, without a shot being fired , as one critic contemptuously expressed it " I never heard so much as one louse killed by either Army Mr William Angus sends me from HM General Register House, Edinburgh, a copy of an entry in the printed calendar of State papers, Domestic, 1639 which runs as follows

> 1639 July 10th Berwick Richard Jannsey to Richard Harvey My master commanded me to send two of his trunks with Lord Newport s goods by reason of his longer stay here, I fetched them from thence and have sent them by sea with the Lord General s goods ,
>
> P S —Dr Boten (Bethune) is buried this day, and Dr Harvey is in his place and Dr Johnson has Harvey s place '

The King was accompanied by more than one physician and Dr Bethune had been senior to Harvey.

The Short Parliament was dissolved in May, 1640, and this was followed by the Scottish invasion of Northumberland On Aug 28, 1640, the battle of Newburn was fought, the English were defeated and the Scots invaded Northumberland and Durham It has been hinted (Power 1897 Willis 1878a) that Harvey may have been present at the battle of Newburn but this is extremely unlikely since Charles himself was in York at that moment

The next year Harvey went north for the third time In August, 1641, Charles made terms with the Scots and on Aug 13, 1641, he reached Newcastle on his way to Edinburgh to obtain Scottish support against the English Parliament [illegible] was with him on this [illegible] of the Royal party [illegible] received the freedom of Aberdeen on Aug 30, 1641

IN CIVIL WAR

In November, 1641, Parliament under Pym s guidance proceeded to formulate the Grand Remonstrance, and the Civil War began on Aug 22, 1642, when Charles raised his standard at Nottingham From now onwards the details of Harvey's career are better known and the circumstances surrounding his presence at the indecisive battle of Edgehill on Oct 23, 1642 have been often referred to

Harvey was now 64 years old and was probably relieved and happy to settle in Oxford, when Charles and his troops fell back to that city after the battle of Edgehill His attendance on the Queen, his daily observations on the growth of the chick with Dr Bathurst, and his Wardenship of Merton College are well known After leaving Oxford he returned to London as the guest of one or other of his brothers When Dr Ent visited him at Christmas in 1650 to obtain permission to publish his papers on generation, and asking him if all were well with him, Harvey replied

> How can that be when the State is so agitated by storms and I myself am yet in the open sea ? And indeed," he added, were not my mind solaced by my studies and the recollection of the observations I have formerly made, there is nothing which should make me desirous of a longer continuance But thus employed this obscure life and vacation from public cares, which disquiet other minds is the medicine of mine

At this moment we too find ourselves in the open sea '

Though Harvey himself played little active part in the care of the sick and wounded he must have been aware of any plans for their reception and treatment These were matters which Charles must have discussed with Harvey as we know that the King took an humane interest in the disposal and treatment of the wounded on both sides We would have expected also that Harvey must have observed facts of interest to him connected with bleeding in wounds

Up to the 18th century the physician s rôle in war as in the case of Harvey was confined to his duties as personal physician to Royalty or to a commander in the field It has been truly stated that the 17th century was an age of extraordinary activity in science art and literature while the practice of medicine, hospital management and organised care of the sick and wounded sank to a very low level ' (Garrison 1922) During Elizabethan and early Stuart times the unit of military organisation was the company, and the captain of the company was expected to provide his own surgeon and the necessary equipment—though the captains often failed in their duty or appointed very unsuitable surgeons

In the Civil War (1642 51) there was a great shortage of army doctors on both sides At the outbreak the Royalist party obtained the services of medical officers more easily than the Roundheads but as the war proceeded the Parliamentarians, controlling the government and the treasury, were better served On both sides much of the medical care of the sick and wounded devolved on the local practitioners (Firth 1902)

The military surgeons were treated as non combatants and wore a distinguishing badge Surgeons says an Elizabethan author, ' must wear their baldric whereby they may be known in time of slaughter it is their charter in the field ' After a battle the collection and treatment of the wounded was haphazard and casual A victorious general ordered or allowed the people of the countryside to carry away the wounded left behind by the conquered Officers were borne away to neighbouring country houses where the lady of the house might have some skill in the dressing of wounds Mrs Hutchinson wife of the Parliamentary governor of Nottingham bound up the wounds of Royalist prisoners as well as Parliamentarians doing what she thought was her duty to them, as fellow creatures not as enemies even though Captain Palmer, a Parliamentarian came in and told her his soul abhorred to see this favour to the enemies of God ' (Hutchinson 1846)

In 1645 Parliament reorganised its forces and each army had a physician general a surgeon general and an apothecary general

After the Civil War (1651) there were consecutive appointments as physician general to the army whose chief duty was to select physicians for service in the army and in war time he was often made personal physician to the commander in chief in the field On the field of battle it is probable that the organisation for the care of the sick and wounded was in the hands of the surgeon-general and that the work of the physician-general was limited to the hospital.

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[1] Extracts from the Harveian Oration delivered before the Royal College of Physicians of London on Oct 18 1943

PIONEERS OF MILITARY MEDICINE

At the beginning of the 18th century England was allied with Holland against the French in the war of the Spanish Succession (1701–13). The English forces numbered about 40,000: poverty and impressment were the chief recruiting agents. In the great battles of that period (Blenheim 1704, Ramillies 1706, Oudenarde 1708, Malplaquet 1709) Marlborough's personal care of the sick and wounded stands out more prominently than the individual work of any particular physician. Before the action of Blenheim (1704) "he took pains to have the surgeons shown the exact places of assemblage and care of the wounded," and after the victory he wrote to Godolphin "I have been so employed about our own wounded men and prisoners that I had not had one hour's quiet" (Garrison 1922).

The real pioneers of English military medicine arose in the war of the Austrian Succession (1740–48) in the persons of Pringle, Brocklesby, Donald Munro and George Cleghorn, of whom the most outstanding figure was Sir John Pringle (Munk 1878b).

Taking his doctor's degree in Leyden in 1730 and after a period of study in Paris, Pringle was made professor of pneumatics and moral philosophy at Edinburgh University (1734). The Earl of Stair, appointed to command the British troops in Flanders, took Pringle with him as his private physician and made him physician to the military hospital there. Pringle was at the battle of Dettingen on July 27, 1743, and is given the credit of suggesting to the Earl that hospitals should be respected and protected by the opposing forces. The Earl wrote to the Duc de Noailles requesting his acquiescence in this suggestion. The Duc readily agreed and immediately gave practical effect to his promise by going out of his way to avoid disturbance or damage to the British hospital stationed at Feckenheim. This episode has recently been referred to by Lord Amulree (1943).

When the Earl of Stair returned to England the Duke of Cumberland persuaded Pringle to remain in Flanders and made him physician-general to the forces and physician to the royal hospitals. Pringle returned to England when the Duke was recalled to lead the forces against the Jacobites in 1745, and he remained with that Army to the battle of Culloden (April 16, 1746). He then returned to the continent and remained in Dutch Brabant until the treaty of Aix la Chapelle (1748) brought hostilities to an end.

Settling in London practice in 1749 he became physician to the Duke of Cumberland and remained in the Army as a director of, and physician to, Chelsea Hospital. In 1750 he published his *Observations on the nature and cure of hospital and jayl fevers* in which he showed that the common fever was typhus and that it was the same in both hospital and gaol.

In 1752 he published *Observations on the Diseases of the Army* (Pringle 1812) which established his claim to be the father of modern military hygiene and medicine. In the preface he makes this remark:

> "This branch of medicine, which ought long ago to have been complete, seemed to be still in a manner new: so little is a military life consistent with that state of tranquillity requisite for study and observation."

In this work he gave his medical experiences of the campaigns in Flanders (1742–45), in Great Britain (1745–46) and in Dutch Brabant (1746–47–48). He had studied the atmospheric and seasonal conditions in each locality. He demonstrated the better health of troops situated in camps on high ground as opposed to low marshy ground, and that the upper stories of houses were more healthy than the lower. He attributed much of the ill health of soldiers and the causes of disease to such factors as foul air from marshes, decaying vegetable matter and soiling of the ground with animal excreta. He preached against overcrowding in barracks, hospitals, gaols, and ships and showed by statistics the importance of air space. Under suitable conditions he advocated the ventilating system invented by the Rev. Stephen Hales, the ingenious rector of Teddington, with whose experiments on arterial and venous pressure we are more familiar. Pringle thought that all men should contribute to, or be compelled to feed in a mess, in order to ensure sufficient and suitable food, as the soldier was apt to spend on drink in one day what ought to keep him in food for one week. He was the first to make a serious attempt to discriminate between the various fevers, though he thought one type of fever might develop into another. He recommended improvements in bedding, clothes, blankets, shoes and advocated plenty of warmth and fuel. He advised recreations and diversions for the soldier in training. He pointed out that dysentery and fevers often appear together in the same season.

Pringle became a licentiate of the college in 1758 and was elected a Fellow in 1763: nominated Censor in 1770 he declined to act and paid the statutory fine. In the Royal Society he played a distinguished part: elected a Fellow in 1745, he was awarded the Copley medal for his experiments on septic and aseptic substances, an account of which is included in his *Observations on the diseases of the Army.* In 1772 he was elected President (1772–78) and was in the habit of discoursing on the subjects for which the Copley medal was annually awarded, "displaying a breadth of knowledge and depth of learning which greatly impressed his contemporaries." He was an intimate friend of Captain Cook and it must have given Pringle immense satisfaction to award the Copley medal to the explorer (in absentia) for his account of the means by which he kept his crews free from scurvy. He died of an apoplexy in 1782, aged 75 years.

During the same period of the 18th century medical reformers arose in the Navy. The accounts of Anson's and other voyages of that time leave little doubt that Smollett's gruesome description of life at sea in *Roderick Random* was no exaggeration. "I was much less surprised that people should die on board, than that any sick person should recover." Fortunately there appeared in the Navy three physicians who did much to improve the unhappy lot of the seamen—Lind, Blane and Trotter. Thomas Trotter said "the Army of the country could boast of a Pringle, Cleghorn, Munro and some others who have written since the last war, but the name of Lind stands alone in the Navy."

THE FATHER OF THE RAMC

Between 1793 and the battle of Waterloo (1815) England sent expeditionary forces to meet Napoleon on the continent and in Egypt. The military life of Sir James McGrigor (1861) began at this eventful period. His autobiography covers his life from the time of his joining the Army in 1793 up to his appointment as director-general in 1815—twenty-two years. For eleven years he was the medical officer to the 88th Regiment which became the Connaught Rangers, and saw service with them in Jersey, Holland, the West Indies, India and Egypt. He was continually fighting typhus fever and from his earliest service the sick quarters under his charge were always cleanly, when often the living quarters of the regiment were filthy. He kept notes of all his cases during the five months' voyage to India and presented to the Bombay Medical Society in 1801 *A memoir on the health of the 88th and other regiments from June 1800 to May 1801.* When peace was signed McGrigor returned to England and was transferred to the Royal Horse Guards at Windsor. There he found a small cramped military hospital, rampant with typhus and hospital gangrene. He obtained a larger and more roomy building and "by moving the men from one ward to another, changing the atmosphere and destroying all the sponges used in dressing, together with other precautions he finally got rid of the disease."

In 1805 he was made a deputy inspector-general of hospitals, and served in the Northern Command before being appointed by the Duke of Cumberland to the more important South-Western Command. He made full use of his powers of organisation in both Commands, inspiring all the officers under his charge with his clinical zeal; with their willing coöperation he collected valuable statistics. He was sent to Walcheren in 1809 where the British camping grounds were under water and three thousand men were sick with malaria. He commandeered from an American vessel a supply of "the bark" which was lamentably short.

Towards the end of 1811 he was appointed chief of the medical staff under Lord Wellington in the Peninsula and he arrived in Lisbon on Jan. 10, 1812. He was engaged in all the battles and sieges from Ciudad Rodrigo to Toulouse. He soon gained the confidence of Lord Wellington and was ordered to wait on him daily after breakfast, together with the adjutant-general, the quartermaster-general, and the commissary-general, to present a report on the number of sick and wounded with all the details of their disposal. When the Army eventually advanced against Vittoria the efficiency of the medical services had provided Wellington with some 4000–5000 men whom he thought would have been lost to him from ill health—and a distinguished person said "that he thought the extraordinary exertions of the medical officers of the Army might be said to have decided the day at Vittoria."

When Wellington was writing his despatch to the Earl of Liverpool after the captur [illegible] the room with his report and [illegible] in excellent spirits requestc [illegible] ical officers should be noticed. Though Wellington had completed his despatch he made this addition:—

Camp at Badajoz, 8th April, 1812.

MY LORD,—It gives me great pleasure to inform your Lordship [illegible]

WELLINGTON.

This was the first time that the work of medical officers had been mentioned in a despatch and publicly acknowledged. The example was followed later by the Navy.

The downfall of Napoleon enabled McGrigor to visit Paris and other towns to inspect the French system of dealing with their sick and wounded, but the only features which impressed him were the ambulances. After the peace he retired with a pension of £3 a day and [illegible] the Army as director- [illegible] borate plans for the [illegible] service.

By his frequent contact and correspondence with medical officers of all ranks he brought about a new spirit of interest and keenness on their work. He was mindful of the hardships of soldiers' widows and children, and in 1816 founded the Army Medical Friendly Society which provided annuities for widows of fallen officers, an insurance agency [illegible] £80,000 when he retired in 1851. [illegible] the Medical Benevolent Society [illegible]

He [illegible] man and a [illegible] rded as the [illegible] him "He i [illegible] ıblic servants I have ever met with."

PRELUDE TO MODERN WAR

"The Crimean W [illegible] to conduct a war [illegible] personnel and at [illegible] and hamper the c [illegible] area by orders from the central government, who could only have an academic knowledge of the conditions in the actual theatre of war" (Garrison 1922b).

The British entered the war, with only 40 ambulance wagons, *a pack mule* and 10 litters for each regiment, no winter clothing, no shelter tents and a worthless corps of male n [illegible] from the line." The suffering tr [illegible] ed in wooden huts with adequ [illegible] Florence Nightingale went c [illegible] nurses. By these means the [illegible] went down, though that of the French went up since they were still under canvas during the severe winter *of 1855–56*. The losses per thousand from disease were the highest in history; the diseases being cholera, typhus, dysentery and scurvy.

In the South African War (1899–1902) the losses by [illegible] shot and shell. [illegible] with an average [illegible] the annual ratio [illegible] oops was 34 for wounds and 813 for sickness. There were *59,750* cases of enteric fever, with 8227 deaths. Antityphoid inoculation based on the work of Sir Almroth Wright was still in the experimental stage and was only employed on a restricted scale. In the garrison of Ladysmith 1705 were inoculated and 10,529 were uninoculated (A. E. Wright, *Lancet*, 1902, ii, 651).

A NEW ORDER

The war of 1914–18 saw clinical physicians for the first time in war employed as medical specialists in hospitals and in a consulting capacity in armies and in the fleet. The medical organisation of the army in France as it [illegible] on a sessile type of warfare, [illegible] clinical work and investiga- [illegible] the conditions of medical practice met with at home in times of peace. Both physicians and surgeons were greatly helped in their work by the mobile laboratories, and a hospital which had attached to it an efficient radiological department and a mobile laboratory was able to do clinical work of a high order. The Medical Research Council established an active link between the work done in France and England. So we had physicians, surgeons, sanitarians, bacteriologists and radiologists working together as teams and not as individuals. Today we commemorate the work rather than the names of those who advanced the knowledge of medicine in the last war and made the lot of the sick soldier incomparably better than had been possible in any previous war. If no names are mentioned, no-one can be forgotten. In a brief review of some of the lessons of the last war it will be apparent that recent advances in medical knowledge have already solved some of the problems of that day, and the solution of many has been accomplished by the brilliant discoveries in chemotherapy.

The standard of medical work depends upon the state of medical knowledge of the day, and in the interval of *14 years between the South African and the 1914* war no branch of medicine had developed so rapidly as bacteriology. The application of this recently acquired knowledge enabled physicians to attack infections with a hope of success denie [illegible] At the outbreak of the last [illegible] were taken against smallpox [illegible] ite of vaccination against infection by the *B. typhosus* there were many cases of clinical enteric fever in France in 1914 and 1915, early proved to be infections by *B. paratyphosus A* and *B*. When a mixed vaccine (TAB) was employed from 1916 onwards the incidence of enteric cases became negligible. Certain experiences in the present war in the Middle East with Italian prisoners and British prisoners in Italian hands has shown the superiority of our *antityphoid vaccination. In both wars vaccination* against plague and cholera has been employed, and in this war against yellow fever when it seems advisable.

In all wars dysentery—amœbic and bacillary—have taken a heavy toll. In the last war bismuth emetine iodide was found to be highly efficacious in the treatment of amœbic dysentery and now we have in sulphaguanidine a remedy of proved value in bacillary dysentery. So also the use of the sulphonamides in the treatment of cerebrospinal meningitis has taken the sting out of a disease whose mortality was so high in the last war (35%). Malaria was one of the major problems of the last war and in Macedonia alone there were 160,000 admissions to hospital in 3 years (1916–18); today with troops even wider spread, it may become responsible for more casualties than any other single factor.

It was only fully realised towards the end of the last war how vast was the wastage from minor ailments. Statistics compiled from admissions to a group of casualty clearing stations showed that 14% of all admissions were due to such diseases as scabies, pyodermia, myalgia, rheumatism and "PUO"; 25% were cases of scabies or some forms of pyodermia, preventable *by cleanliness, and the remaining 19% included* trench fever, myalgia, rheumatism and PUO. In short, the greater part of a sick wastage of this magnitude was due to disease which could be prevented by personal cleanliness and simple principles of sanitation (History of the Great War (1921–23). The combined work of clinicians and bacteriologists established the entity of two new diseases: trench fever and spirochætosis icterohæmorrhagica.

The experience which physicians and surgeons gained from gunshot wounds of the chest in the war gave an impetus to the development of chest surgery in civilian practice. Valuable contributions were made to physiology by the study of organs damaged by war injuries, and injuries of the central and peripheral nervous systems afforded opportunities of physiological as well as pathological study. Injury to peripheral nerves provided abundant material, as Weir Mitchell had found in the American Civil War. Studies of the effects of such injuries contributed more exact anatomical information of the peripheral distribution of the nerves, and threw doubt on the validity of the theory of protopathic and epicritic sensibility.

Observation of the immediate and remote effects of gunshot wounds of the spinal cord contributed to a more exact knowledge of the function of its constituent parts. Among other observations it was shown that after complete severance of the spinal cord the lower limbs might regain their tone and the knee-jerks reappear, if the general condition of the patient remained good and there was no local sepsis such as cystitis or bedsores. This return of limited function refuted Bastian's hitherto accepted law. A "mass reflex" on stimulation of the lower limbs was described in which the legs are withdrawn, the bladder evacuated, semen ejected, and sweating is intense.

Wounds of the cerebrum and cerebellum reproduced conditions comparable to experiments carried out on animals and enabled clinicians to study the functions of these areas, uncomplicated by the effects of pressure seen in the presence of tumours. By such observations light was thrown on the localisation of the visual paths, the mechanism of speech and the cortical representation of sensation (Head, Holmes et. al.).

The first serious attempt to study shock was made in the last war, and physicians, surgeons, physiologists, chemists and pathologists all contributed to it. Hæmoconcentration and the loss of circulating fluid were combated by replacement with gum-saline and tentatively with blood. Today with greater knowledge of the pitfalls of blood-matching, the use of blood, plasma and serum has become routine practice. There is still much to be learned about the clinical recognition of shock and its prevention.

The peripheral vascular disturbances caused by trench foot, shelter foot, immersion foot and frostbite have been widely studied, and improved methods of prevention and treatment have been elaborated. The study of survivors from shipwreck has brought to light the physical and mental tortures through which they have passed, and suggestions have been made to minimise the dangers to which the shipwrecked mariner is inevitably exposed in both hot and cold climates. Injuries by crushing and by blast have been sufficiently frequent in this war to enable the clinical pictures to be recognised, and experimental work is forwarding the elucidation of the physiological and pathological tissue reactions to both varieties of trauma. Aviation medicine has problems of its own because the genius of the engineer tends to outstrip the power of human adaptation to incredible altitude and speed.

Mass experiments in the psychological study of the war worker as well as of those serving in the Forces are being carried out. Problems of feeding and nutrition, of supreme importance during the war, will loom even larger after it. Harvey knew the desolation in Europe during the 30 years' war when he wrote to Lord Dorchester:—

> "The miseries of the countries we have passed and the hopes of our good success and all such news your Honour hath from better hands. I can only complain, that by the way we could scarce see a dog, crow, kite, raven or any bird, or anything to anatomise, only some few miserable people, the relics of the war and the plague, where famine had made anatomies before I came. It is scarce credible in so rich, populous and plentiful countries as these were that so much misery, desolation and poverty and famine should in so short a time be, as we have seen, I interpret it well, that will be a great motive for all here to have and procure an assurance of a settled peace. It is time to leave fighting when, there is nothing to eat, nothing to be kept and gotten and the same parties rob on the other if they get but once out of sight."

History is apt to repeat itself.

In our attempts to cope with present problems and future difficulties it is only necessary for me to exhort the ws and Members of this College to contribute their endeavour in imitation of those benefactors whose example I have so inadequately commemorated.

Lastly, the medical profession is likely to undergo changes which will call for patience and forbearance on the part of every member of it, and the shaping of such changes will be rendered easier if we have that mutual love and affection amongst ourselves which Harvey enjoined upon us, ever remembering that *concordiâ res parvæ crescunt, discordiâ magnæ dilabuntur*.

Before the dawn of another St. Luke's day I trust that we may have the prospect of attaining that place in nature which Harvey (Willis 1878b) thought was man's destiny. "Man," says Harvey, "comes into the world naked and unarmed, as if nature had destined him for a social creature, and ordained that he should live under equitable laws and in peace; as if she had desired that he should be guided by reason rather than be driven by force."

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LOCALISED NEURITIS OF THE SHOULDER GIRDLE

A REPORT OF 46 CASES IN THE MEF

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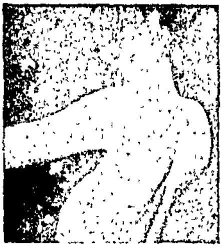
MAJOR RAMC; MEDICAL SPECIALIST AT A GENERAL HOSPITAL, MEF

THE commonest form of neuritis in the MEF is without doubt diphtheritic polyneuritis. The high incidence of this complication with the long disability resulting has received much comment. Acute febrile polyneuritis is rare while polyneuritis following dysentery, malaria and enteric fever has been infrequent. I have not encountered any such cases, and it is interesting to recall that Walshe (1941) recorded that in 4 years with the Egyptian Expeditionary Force in 1915–19 he saw no case of true polyneuritis associated with those diseases. Fibrositis is common but the ordinary clinical forms of interstitial neuritis are not often seen in general hospitals.

TWO GROUPS

A number of cases with unusual neuritic features, however, has come to be recognised in the MEF which, as far as I have been able to ascertain, were not observed before the war in such numbers. The disability has been seen in British, Australian, New Zealand and American troops in the Middle East, and in troops in the United Kingdom. In 2½ years in one military hospital in England I saw 10 such cases. In 9 months in the Middle East I have encountered another 10, and through the courtesy of Brigadier McAlpine, lately consultant neurologist to the MEF, I have been able to study the records of some 80 cases of neuritis of the upper and lower limbs. From this experience and analysis, a fairly clear clinical picture emerged of what might be called localised neuritis of the shoulder girdle. Details of 46 patients are available. They fall into two groups.

In group 1 (26 cases) the affection of the shoulder girdle developed while the patient was in hospital with some other illness. In most cases he had reached the stage of convalescence and in all he was afebrile. A few patients had already been transferred to convalescent depot. No common factor could be detected and in all these cases evidence of faucial or cutaneous diphtheritic infection was lacking.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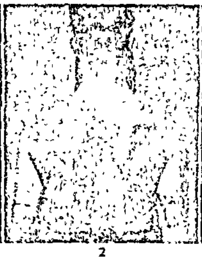
Case 1: winging of right scapula.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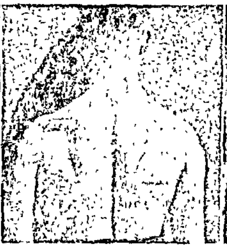
Case 2: wasting of right infraspinatus.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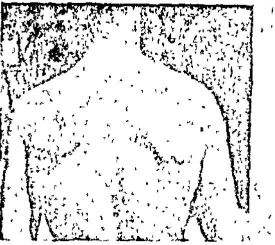
Atrophy of left infraspinatus.


4
Atrophy of the left deltoid and spinati.

The conditions for which these patients were receiving treatment were:

Dysentery: bacillary	6	Infective hepatitis	2
amœbic	2	Tuberculous gland of neck	1
Malaria (benign tertian)	3	Typhus	1
Gunshot wounds	3	Pharyngitis	1
Local sepsis	3	Lobar pneumonia	1
Enteric fever	2	Cerebrospinal fever	1

In group 2 (20 cases) the illness began while the patient was on duty in the field. Some of these were admitted to hospital early but most were not admitted until weakness at the shoulder had developed.

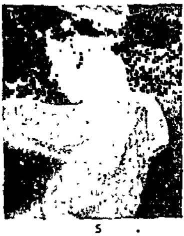
CLINICAL FEATURES

In 42 of these 46 cases the onset of the illness was characterised by sharp pain about the affected shoulder. It was felt in one, two or three fairly well-localised points and in some it radiated down the arm. The painful sites were usually to be found along the upper border of the trapezius, over the spinati and the belly of the deltoid. Pain was sometimes felt along the inner border of the scapula, in the axilla or up the side of the neck. Many patients said it was severe and burning and nearly all of them needed analgesics. Morphia was required in 4. The pain was commonly worse at night and disturbed or prevented sleep. It was aggravated by lying on the affected side and persisted acutely for from 3 to 14 days; thereafter it rapidly subsided, but in a few cases a chronic ache with occasional exacerbation was complained of for 6 or 7 weeks. The pressure of braces or the weight of a gun or pack aggravated the discomfort. Carrying a weight on the affected side became impossible. In 4 patients there was no history of acute pain and the disability was not noticed until weakness had developed. I formed the impression that pain was more severe in those muscles which subsequently showed atrophy, with the possible exception of the serratus magnus when pain was often mild or absent.

With one exception, the onset and course of the malady was afebrile. Headache, malaise, sweating, flushing, drowsiness, faucial inflammation, loss of appetite, vomiting and diarrhœa were never observed; nor were stiffness of the neck and spine, diffuse hyperæsthesia or alteration of tendon reflexes. The painful sites were invariably tender but no vasomotor or trophic changes developed in the hand on the affected side. There were no cranial nerve palsies. In 9 cases in which the white cells were counted results were normal. The cerebrospinal fluid was examined in 13 instances, in 7 during the acute phase; in none was there any cellular reaction and in only one was the protein content raised (60 mg.). Weakness about the shoulder girdle usually followed in 4 or 5 days but in a few it seemed to be present on the second day, while rarely it followed after a few weeks [illegible] the illness was [illegible] sting of certain [illegible] nost cases this [illegible] uch disability. I have never seen any certain restoration of muscle tissue in such cases but in the mild examples there was slow improvement. The right side was affected in 30 patients, the left side in 9 while in 7 the lesion was bilateral (but always asymmetrical). The muscles affected were:

	Cases		Cases
Serratus magnus	31	Trapezius	11
Spinati	24	Sternomastoid	1
Deltoid	17	Rhomboids	?

In 10 instances the muscle or muscles supplied by one nerve only were affected; serratus magnus 13, spinati 2, deltoid 4. No definite weakness or atrophy was ever detected in the pectorals, latissimus dorsi, biceps, triceps, brachialis, brachioradialis or the muscles of the forearm and hand. The legs were never involved. In the absence of involvement of the deltoid no cutaneous sensory alterations were detected. Of 17 patients in whom the deltoid was affected there was sensory loss over the cutaneous zone supplied by the circumflex nerve in 10. It was absent in 3 and not recorded in 4. As would be expected effective movements of the shoulder girdle were greatly hampered. The wasted deltoid with paralysis of abduction, the hollowed supraspinous and infraspinous fossæ of the scapula and the winging of the scapula, alone or in various combinations, produced a striking deformity of the shoulder girdle (figs. 1–8). Atrophy of the serratus digitations could be identified in 2 cases. The lower fibres of the trapezius were affected more often than the upper, and sometimes resulted in slight winging or inward displacement of the inferior angle of the scapula. In one patient wasting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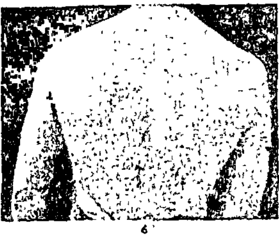
Paralysis of right serratus magnus.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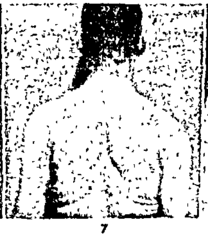
Atrophy of right deltoid and spinati.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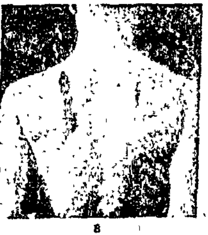
Wasting of right trapezius and deltoid.


8
Wasting and weakness of left trapezius and serratus magnus.

weakness and loss of faradic responses of the sternomastoid was associated with complete trapezius involvement on the same side. In no case was there any convincing evidence of involvement of the rhomboids.

PROGNOSIS AND TREATMENT

I have not been able to follow up these patients personally but have been impressed by the failure to improve in those cases developing obvious atrophy. Mild cases were returned to duty or down-graded while those with a pronounced disability were evacuated. The usual forms of treatment for neuritis in general did not seem to alter the course of the illness. Analgesics, physiotherapy and relaxation of paralysed muscles were prescribed. Relaxation of the serratus magnus is difficult to secure. Several patients showed no improvement after 7 or 8 months. Permanent paralysis of the serratus magnus is such a troublesome disability that the question of transplanting the sternocostal portion of pectoralis major from the humerus to the inferior angle of the scapula, as originally suggested by Sherren, might well have to be considered.

NATURE OF THE ILLNESS

If these patients are seen for the first time some months after the acute phase the malady might be mistaken for poliomyelitis: the end-result can be identical in both diseases. Consideration of a few features, however, should lead to the exclusion of poliomyelitis.

1. There is a striking absence of general signs of infection (such as fever and leucocytosis), and of signs of meningeal irritation.
2. Examinations of CSF, so far as they go, have yielded normal results; but further information is needed.
3. Diffuse hyperæsthesia, so characteristic of poliomyelitis in the acute phase, was not encountered, whereas definite cutaneous sensory loss of peripheral distribution was detected in 10 out of 17 cases where a mixed motor and sensory nerve was involved (for example, the circumflex).
4. The distribution of the paralysis about the shoulder girdle took on a peripheral rather than a segmental character. In 19 patients only one nerve was impaired while the deltoid escaped in no less than 29—a very unusual finding in cervical poliomyelitis.
5. In 26 patients the illness developed while they were convalescing from some complaint—again an unusual finding in poliomyelitis.
6. It would be unlikely to expect so many cases of atypical localised cervical poliomyelitis in the absence of typical examples of the disease at about the same time in the same locality. I have seen 1 case of poliomyelitis during the past 9 months.

It is interesting to compare these observations with those made during the recent epidemic of poliomyelitis in Malta (Tunbridge 1943).

In a series of 58 cases 43 ran a fever for from 2 to 8 days The CSF was normal in 2 instances only; it was examined in 57 patients and showed characteristic increase of protein and cells (up to 900 per c.mm.). In only 7 patients was the disability confined to one arm or shoulder while the deltoid escaped in only one patient out of a total of 36 in whom the cervical cord was involved. Paralysis failed to develop in 2 patients. This low figure is interesting in view of the general awareness of medical officers on the island and the fact that a sharp lookout was kept for early cases. It contrasts remarkably with the experience of New Zealand medical officers in the ME who record that of 40 cases 19 did not develop paralysis. Fever was absent in 4 and headache in only 1 case. Backache was present in 20, spinal rigidity in 16, neck rigidity in 25, photophobia in 17, pain on movement of the eyes in 16 and vomiting in 23 (Caughey 1943). The CSF showed the usual picture of mixed pleocytosis. It is reasonable to conclude therefore that the condition under discussion is not poliomyelitis although no doubt the two diseases can be confused.

The question next to consider is that of acute brachial radiculitis or neuritis. As ordinarily understood these terms imply an interstitial inflammation of the nerve trunks of the brachial plexus or of the emerging peripheral nerves. The clinical features are pain, tenderness, paræsthesiæ and sometimes trophic changes. General weakness of the arm is the rule rather than paralysis of individual muscles while gross permanent atrophy and a peripheral type of sensory loss are rare sequels. Fibrillation and alteration of tendon reflexes are common while there may be evidence of fibrositis elsewhere. Recovery is the rule. This is a sequence rather different from that outlined in this series. The freedom enjoyed by other muscles (pectorals, latissimus dorsi, rhomboids, biceps, triceps, brachialis and brachioradialis) innervated from the same segmental level (cervical 5, 6 and 7) of the spinal cord suggests that the lesion is not a diffuse affection of the brachial plexus or spinal nerve-roots. Isolated paralysis of the serratus magnus, spinati or deltoid muscles can only be explained on the basis of a peripheral mononeuritis and combinations of these would not be unexpected.

It is therefore deduced that the lesion is essentially peripheral. It may begin as a myositis or as a genuine peripheral neuritis. There is no doubt that the nerves (suprascapular, circumflex and long thoracic) themselves are involved in the pathological process. Muscle biopsy in the acute phase might yield some information.

ÆTIOLOGY

The uniformity of the clinical findings in this series is rather striking but this does not necessarily imply a common causation. Indeed these patients may represent a mixed group. What is certain, however, is that such cases were not common in civilian practice before the war. Isolated paralysis of the serratus magnus or spinati was rarely encountered, whereas many medical officers in the Army must have come across cases of this sort during the last 4 years. It would be interesting to know whether the affection has increased in civilian practice and whether it has occur[illegible] N[illegible] and RAF personnel. In respect of [illegible] two considerations spring to mind. Firstly, the upper arm has been subjected to many injections of substances which can produce a local neuritis (TAB, TT, serum, sulphonamides, emetine, quinine, &c.). In this series, however, the occasional examples of obvious association have been excluded; but others may have been included in which this relationship is less apparent. The preponderance of right-sided cases (30) and the selective nature of the muscle wasting suggests that "injection neuritis" is not an important factor.

Trauma also needs consideration. Cases with a history of direct trauma have been excluded from this series, but the problem of repeated minor traumata is difficult to solve. It is quite possible that the long thoracic and suprascapular nerves could be injured by carrying a weight (pack and rifle) across the shoulder. The constitutional type of shoulder girdle and the tone of the supporting muscles might then be secondary ætiological factors. Many of these patients, however, were employed in sedentary posts and it will be recalled that 26 of them developed the illness while convalescing in hospital from some other affection. Nevertheless, I can recall one patient who developed pain in the right shoulder after carrying out pack drill on the first morning of his return to duty after an attack of lobar pneumonia. He rapidly developed an isolated serratus palsy. I have never seen a typical case in an officer, though I understand they have been recorded.

There have been several recent papers dealing with relevant material.

Burnard and Fox (1942) of the New Zealand Medical Corps have published an account of 9 cases occurring in the 2nd New Zealand Expeditionary Force in the Middle East. They are similar to those I have described. The lesion was on the right side in 6 and on the left in 3. In 3 patients the onset was while they were in bed with some other complaint (bronchitis, influenza, and fractured leg). The trapezius was affected in all cases, the spinati in 5, the serratus magnus in 5, the deltoid in 4 (slight involvement only). The rhomboids were not affected but in one patient it was thought that the pectorals were slightly wasted. There was very doubtful wasting (½ in.) of the biceps in 4 and interosseous wasting in 2 patients. The authors noted that recovery was poor and concluded that the lesion was a multiple neuritis in the region of the shoulder girdle.

Richardson (1942) described 9 examples of serratus magnus palsy seen in soldiers at one military hospital in the United Kingdom during one year. In 6 the serratus magnus was the only muscle affected. In one the lower fibres of the trapezius were also involved. In another the trapezius, infraspinatus, *and deltoid of the other side were wasted while in the 9th* case the deltoid and spinati of the opposite side were affected. The lesion was unilateral in 7 and bilateral in 2 patients. The right side was affected in 8 and the left side in 3 patients. A history of trauma was obtained in 1 case, 1 followed an attack of lobar pneumonia and 1 arose during glandular fever. An injection of antitetanic serum initiated another case.

Wyburn-Mason (1941) has drawn attention to the increase [illegible] August, 1941. In most the paresis was general and in chronic cases it was followed by wasting. In a few patients wasting was limited to the serratus magnus and triceps. Sensory changes of a wide distribution were a constant finding. Prognosis was good in all but severe cases. The author mentioned that in 3 months he had also seen 7 of isolated paralysis of the external popliteal nerve. Foot-drop and characteristic sensory change were recorded and in one patient there was a simultaneous bout of brachial neuritis. None of the patients had had serum injections.

Macpherson and Clark (1943) have seen during one year 10 cases of isolated paralysis of the external popliteal nerve in soldiers serving in Malta. The onset was sudden, painless, and not accompanied by signs of general infection. They noted excellent recovery in all but with a tendency to relapse in a few patients. Over the same period they encountered cases of paralysis of the serratus magnus. One of these followed typhoid fever, one arose during an attack of infective hepatitis and the third appeared spontaneously. I have seen similar cases in the Middle East and the United Kingdom. I have records of 7 examples of paralysis of the external popliteal nerve, 7 of the musculospiral nerve, 4 of the anterior crural nerve, 1 of the lateral cutaneous nerve of the thigh and 1 of the ulnar nerve. The painless nature of the malady and the invariable recovery suggests an ætiology which differs from that of the shoulder-girdle affection. There were no cutaneous sores in these 20 patients.

CONCLUSION

Experience indicates, therefore, that there has been an increase in the incidence of brachial neuritis in civilians in Great Britain and in the incidence of isolated paralysis of individual nerves in the upper and lower limbs of soldiers both at home and in the Middle East.

A group of 46 cases has been defined in which an unusual degree of wasting of certain muscles about the shoulder girdle of fairly rapid onset has been the characteristic clinical feature. In some cases it seems that the disability is permanent.

[illegible] in most cases. It is probable [illegible] belong to the same [illegible] isolated examples of neuritis of arm and leg is uncertain.

[illegible] such cases.

I am grateful to Major-General Sir P. S. Tomlinson KBE, DSO, Director of Medical Services, MEF, for permission to publish this paper and to Brigadier D. McAlpine, FRCP, for his advice and suggestions.

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UNIVERSITY OF SHEFFIELD.—The following appointments have been made: Dr. A. I. G. McLaughlin, hon. lecturer in industrial medicine within the department of public health; Dr. P. E. H. Howarth and Dr. R. E. Peasegood, temporary demonstrators in anatomy; Captain J. H. Hale, RAMC, assistant bacteriologist and demonstrator in bacteriology.

OBSERVATIONS ON A TYPHUS EPIDEMIC

C. F. McCONN, MD NUI, MRCP, DPH, DTM & H
ACTING COUNTY MEDICAL OFFICER OF HEALTH FOR GALWAY

IF history is correct most districts of Ireland must have been the seat of typhus fever at one time or another. With the passage of the century it has, except in a few isolated areas on the Western Seaboard, become almost unknown. Districts in these areas where it has been seen during the past fifty years are subject to constant supervision. A few years pass, perhaps a decade, and gradually the physician's conception of the disease changes from the aberrant forms with which previous epidemics started to the more classical book description. Thus one, two, or more atypical cases are missed and an affection dreaded by these same practitioners is under way again.

In circumstances such as these typhus fever broke out in the Spiddal area of West Galway during the [illegible] Several inhabited [illegible] the south Conne- [illegible] outbursts of the disease during the last decade, but Spiddal has been free since its last serious epidemic in 1903–05. At that time the fever was of a severe type with high mortality and its victims included the practitioner in the area. The last reported case in East County Galway was, as far as I can trace, in 1907 in the Loughrea townland. It seemed to me, therefore, that observations on the 1936 outbreak in Carraroe, the 1941 outbreak in Carna, and the recent Spiddal outbreak might be of interest. While the Spiddal outbreak was in progress a number of articles dealing with typhus appeared in the medical journals and so I had the opportunity of applying to an actual epidemic the professorial conception of the disease.

PLANNING CONTROL

The first 2 cases in the Spiddal outburst presented [illegible] fluenza." The symptoms were lethargy, headache, and suffused eyes, the school-going child being especially affected. The school attendance register afforded the names of a considerable number of absentees who, when visited, either gave a history of illness or were actually ill. Those who were pyrexial presented a bluish-red to a slaty-blue rash in the epigastric region. Those who were convalescent gave a history of "influenza" with signs and symptoms such as those found in pyrexial cases; they looked anæmic, and were lethargic with a generalised mottling very like louse-bites. Others gave a similar history but presented no mottling. The onset of the disease in all was abrupt. In the course of [illegible] Not having [illegible] blood-slide [illegible] morning [illegible] they had [illegible] It was [illegible] detecting [illegible] ones with [illegible] help for the actual case, but what interpretation was to be given to the standard test which afforded agglutination to a proteus suspension [illegible] person?

To collect and [illegible] those who were ill was a [illegible] to detect those who had the disease but concealed it, or those *who were incubating it, was a much different one.* We had to decide first what we would accept as a diagnostic titre with the Weil-Felix test. Our plan of campaign was to do a Weil-Felix test on every contact, every child suspect in the area, and the occupants of all houses in which there was a history of illness within the previous two months or in which the state of cleanliness did not conform to average standards. A survey of the area revealed there were 535 such persons out of a population of 2222. An auxiliary fever hospital was established in the area for cleansing, disinfesting and disinfecting, and for observation of doubtful cases; it was staffed with young fever-trained nurses having experience of typhus. Such a field unit has long been prominent in the recommendations of the chief medical adviser of the Local Government Department and this epidemic established its value beyond the slightest doubt.

Topley and Wilson[1] apropos of the Weil-Felix test write:

> "A positive reaction at 1/25 during the first week of the disease may be considered as a presumptive positive, though it appears that about 7 to 9% of persons not suffering from typhus may react at this titre. As a rule the titre rises rapidly, so that a positive diagnosis 1/50 or higher can generally be made by the 8th day."

This we accepted as our standard but with the reservation to do a cross-section survey of the county later and check up on the reaction of patients who had typhus in previous years. The results of this survey I mention below. Any person, therefore, yielding a positive Weil-Felix 1/50 to a *Bacillus proteus* OX 19 suspension we brought in with his contacts to the auxiliary hospital. If, 2 days later, the titre of Weil-Felix rose above 1/50 we transferred that case to the central fever hospital. Bloods that yielded a doubtful reaction we referred for further Weil-Felix tests to extern pathologists. All negative were allowed to go home, their houses, clothing, and goods having been thoroughly treated during their period of detention. The district was, of course, isolated from the first suspicion of the disease, no person being allowed in or out except those who were certified by us as being non-contacts, having an absolutely negative Weil-Felix reaction, and whose clothing was subjected to steam disinfection. Isolating an inland area has difficulties but a coastal area presents the further problem of boat-control. It is recorded that in the 1860s when a major epidemic of typhus occurred in this locality a number of people sailed across the bay to another county and temporarily settled there with disastrous consequences to their new neighbours. All precautions to prevent this, however, were taken by us in this epidemic.

FINDINGS

In all, specimens of blood from 535 persons were examined by us for the Weil-Felix test. Of these people, 14 were typically ill with typhus and gave reactions varying from 1/150 to 1/3000 using *B. proteus* OX 19 suspension. One person of this group who was typically ill gave, on the second day of his illness, a positive reaction to 1/50 only. Of persons with a history of illness in the preceding month 89 gave positive Weil-Felix reactions varying from 1/50 to 1/350 to the same suspension, and 30 gave a negative reaction. With a history of illness in the previous two months 110 gave reactions as follows: 3 reacted to a titre of 1/12; 9 to a titre of 1/25; 7 to 1/50; 14 to 1/100; and 77 were negative. The bloods of those with no history of illness gave the following reactions: 8 agglutinated to a titre of 1/12; 3 to 1/25; 16 to 1/50, and 265 negative.

As regards the degree of verminous infestation of these 535 people: 289 showed verminous heads; 200 showed body lice; and 46 were clean; 2 of those who were clean gave a Weil-Felix reaction, one to 1/25, and the other to 1/50. It was observed that those who were most grossly affected with head and body lice (and this number did not exceed 15), yielded a negative Weil-Felix and had no history of illness. It seems surprising to me that these lice should have escaped infection, especially as the hosts were ambulant and freely mixed with the population. Out of a total population of 2222 about 22% had head and body lice which is not an excessive figure when one considers that in very many instances the housing conditions were very poor. As regards the lice collected in a test-tube from actual cases, no pinkish coloration was noticed, but when examined again two days later they appeared to be swollen. There was only one death in this epidemic, a boy aged 14½. Two patients had had the disease before, in 1903.

In the Carraroe outburst of 1936 there were 5 cases, all adults. The first was diagnosed as "carditis." This patient's wife, who also contracted the disease, had given nursing care to an old couple who had died a month before, and in view of the end-results there can be little doubt that they died of typhus; 2 others of the 5 who contracted the disease had attended the wake of the old couple; 1 of the 5 died. From the 4 cases who survived the infection I took samples of blood for Weil-Felix test in November, 1942. The results obtained were: 2 agglutinated *B. proteus* OX 19 in a titre of 1/50, one in 1/125, and one in 1/25.

In the Carna outburst of 1941 there were 8 cases, all adults. The first patient observed was the district nurse who was suffering from typical typhus and who had been attending a tailor's household for illness resembling influenza. This household fell ill a fortnight after the death of the father, who had not summoned *medical attention*. It is presumed this man died of typhus but he is not included in the series of 8. There were no deaths among these. From 7 of them specimens of blood were taken and examined on Dec. 19, 1942; 1 gave a positive Weil-Felix 1/125; 5 gave 1/50; 1 1/25.

As stated above we decided to check on Weil-Felix results in non-typhus areas. The first area selected was in the western portion of the county in which families from poorer parts of Connemara were given land settlements. Families from the Lettermore area (which includes Carraroe) were selected for the blood test. A member of one of these families was contact to the epidemic there in 1936, and she yielded a positive 1/50 though she had been removed from the area for two years without further association with it in the meantime. Vermin were found on her; the 14 others tested were negative and averagely clean.

The next area selected was in the eastern portion of the county and here 20 children of the poorer class, showing evidence of vermin, were chosen for the test; 9 of these were found negative; 7 yielded a positive 1/12; and 4 yielded a partial-positive 1/20. There was no history of illness simulating influenza or typhus in the area.

An area in the most eastern portion of the county was now selected and 9 children were specifically chosen, 3 *being exceptionally clean and well-nourished*, and 6 being under-nourished, none too clean, showing evidence of vermin, and their parents unemployed. Of the latter group 2 specimens of blood proved unsuitable for examination. Not 1 of the rest of the dirty group gave a positive reaction to *B. proteus* OX 19 although 3 showed a titre of 1/25 to *B. proteus* XK. Of the clean children 1 gave a positive reaction of 1/125, the other 2 being negative. The boy showing the positive result had no history of illness.

In the north-eastern portion of the county a further district was selected and 9 children were chosen whose standard of cleanliness was the reverse of those dealt with in the last district—i.e., 6 were clean children, and 3 dirty, undernourished, and of unemployed parents. The children of the dirty group were all negative; 2 of the clean group gave agglutination to a titre of 1/25 *B. proteus* OX 19.

The figures quoted in the four areas above referred to must not be taken as a true index of the general standard of cleanliness, or uncleanliness, in the county at large, or in the particular areas, as the children were specially selected by us for the purpose of our test.

I consider it noteworthy that there is an obvious difference in dress between the affected people of the typhus sections of Connemara seaboard and the rest of County Galway. The underclothing worn by the former is of heavy closely-woven material, difficult to wash thoroughly and seldom changed, the same garments being worn day and night for long periods; on the other hand, those of the other areas wear lighter materials and often change their clothes or, should they have no change, at least turn them inside out so that a cleaner appearance is presented.

SUMMARY

Typhus in County Galway invariably makes its appearance in an aberrant form, thereby becoming established notwithstanding constant vigilance for signs or symptoms suggestive of it.

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[1] y, W. W. C. and Wilson, G. S. Principles of Bacteriology and 'ty, London, 1936, vol. II, p. 1209.

In periods between epidemics it appears to be kept alive in the area by conditions simulating colds or influenza, and being mild, without any mortality, is undetected, as such cases do not seek medical advice.

A Weil-Felix giving a positive reaction of 1/50 to a *B. proteus* OX 19 suspension, when associated with illness of even the severity of a cold or mild influenza, should be accepted as diagnostic and all precautions taken until a second test is done some days later. Should the titre then rise the evidence is conclusive.

The Weil-Felix reaction does not completely disappear within 6 years of the occurrence of the disease.

A second attack of typhus is possible, 2 such cases having occurred in the Spiddal area.

In all, 53 persons were examined from non-typhus areas. Of these, 3 gave a positive Weil-Felix reaction —1 at 1/125, 1 at 1/50, and 1 at 1/25. We considered the 1/25 reaction of no diagnostic import, the child being clean, well-nourished and having no history of illness. The person who gave the 1/50 was a known contact to the Carraroe epidemic in 1936. No reason can be advanced for the other case who was clean, well-nourished, and who had no history of illness, or contact with either a typhus patient or a typhus area.

RICKETTSIAL AGGLUTINATION STUDIES IN TYPHUS FEVER

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Investigations have been carried out upon the sera of certain patients convalescent from attacks of typhus fever contracted in the Spiddal area of Galway in 1942 as reported by McConn (1943). These studies formed part of a more extensive survey of the antibody response to infection and immunisation by rickettsiæ of the X19 group, but they yielded results which were considered [illegible] ate publication. [illegible] l at intervals of [illegible] were examined for agglutinins to the OX proteus organisms, and to murine and epidemic rickettsiæ.

The proteus tests were carried out in the usual manner with alcoholised suspensions incubated at 50° C. for 4 hours and at 37° C. overnight.

Rickettsial suspensions were made by repeated centrifugation of lung emulsions of mice infected intranasally (Hudson 1940). The final washed deposit at 4000 r.p.m. was suspended in normal saline buffered to a pH of 7·3 with phosphate buffer; after incubation at 37° C. for 4 hours, to facilitate the flocculation of mouse protein, it was stored at 2° C. The supernatant was diluted to the desired opacity for use without formolisation or other chemical treatment and was used after 4 or 5 days' storage when the organisms were usually dead. Doubling dilutions of sera were made, an equal volume of suspension added, and incubation was carried out in Dreyer's tubes at 40° C. for 18 hours in a water-bath. The results are shown in table I which gives the titre of a serum as the reciprocal of the highest dilution (final) with which agglutination was distinctly visible with a hand-lens.

The murine strain was the Wilmington (US) strain, and two epidemic strains were employed—namely, the classical Breinl strain first isolated 15 years ago and a strain recovered from a case of louse-borne typhus in Cairo in 1942 by Major C. E. van Rooyen, RAMC.

[illegible]

seven sera when examine[illegible] two of these showed no reaction with Breinl or murine strains. Five of the sera react[illegible] strains, and four of these show[illegible]

[illegible]

were obtained with the murine organism, whereas bo epidemic strains gave two-plus (++) agglutination.

These results amply confirmed the belief that some least of the patients had been infected by ricketts of the X19 group, although the time of this infecti could not be stated precisely in the absence of knowled of the agglutinin titres during the early stages of t recent illnesses.

SIGNIFICANCE OF THE SEROLOGICAL RESULTS

Agglutir[illegible] uman sera has in t past been [illegible] ns where typhus endemic, a[illegible] 38) that the test is more trust[illegible] than the Weil-Fel test. Tests made by us with rickettsial suspensio prepared as above indicate that sera from persons n exposed [illegible] gglutina ricketts[illegible] prote OX19 in [illegible] out of 4 sera from normal individuals showed weak agglutinatio of murine (but not epidemic) rickettsiæ, in dilutions n exceeding 1 : 40.

For a short time after inoculation with typhus vaccin (Cox type, 1939) most individuals had demonstrabl agglutinins to the homologous rickettsiæ in titres of 4 to 320, and the appearance of these agglutinins wa often associated with an increase in the OX19 agglutinin usually two-fold in d[illegible] tion i inoculated persons wo[illegible] Van de Ende et al. 1943) was [illegible] by th development of potent [illegible] lthoug the OX19 agglutinin did not increase to the same degre in some of them. Sera from cases of typhus in th Middle East and [illegible] OX19 aggl[illegible] agglutinin [illegible]

TABLE I—AGGLUTINATION OF PROTEUS AND RICKETTSIA B SERA OF IRISH CONVALESCENTS

Case	Duration of convalescence (months)	Proteus			Rickettsiæ		
					Murine	Epidemic	
		OX19	OX2	OXK		Breinl	Cairo
T. 1	3	500	125	50	160	640	640
T. 2	3	50	125	50	40	320	160
K. 1	4	125	50	50	0 (20)	0 (40)	0 (40)
K. 2	5	250	50	25	80	320	160
O'D. 1	2	250	25	25	80	80	80
O'D. 2	2½	250	125	25	80	320	80
O'D. 3	2½	25	25	25	0 (20)	—	0 (20)
L. 1	2	0 (25)	0 (25)	0 (25)	0 (20)	0 (40)	40
L. 2	2	50	50	50	0 (20)	0 (40)	80

Figures in parentheses give lowest dilution of serum tested which failed to give agglutination.

mental infection of guineapigs and rabbits with rickettsiæ produced sera which were consistent in possessing rickettsial agglutinins but which had either no agglutinin or a weak titre of agglutinin to OX19.

Table II, which sets out the results with representative sera from animals and from humans, indicates that the ant[illegible] the agglutination of [illegible] specific for the par[illegible] ied. Completely specific sera have not been encountered in either rabbits or humans, whose sera usually show a difference in titre of from four to eight-fold in favour of the homologous species. Yet convalescent sera from guineapigs infected with epidemic rickettsiæ have frequently no demon[illegible] s, although they [illegible] The two species [illegible] *oseri*, which have long been known to possess common antigens (Zinsser and Castaneda 1932), thus appear to have specific antigens as well. Proof of the independence of these antigens has been sought by means of cross-absorption tests on guineapig and rabbit sera, and these have shown an inability of the heterologous rickettsia in each case to remove the agglutinin for the homologous species although it is capable of removing agglutinin for itself. The homologous rickettsia removes agglutinin for both species. Similar results are reported by Plotz (1943) who employed the complement-fixation reaction to demonstrate the specificity of rickettsial antigens.

Thus far, insufficient sera from cases of human typhus, proven by the isolation of the causative rickettsiæ, have been examined for final conclusions to be drawn on the specific nature of the antibody response in man. The agglutination tests with sera from two individuals whose infecting strain was isolated and classified by Major van Rooyen on the basis of guineapig response are shown in table II. The results with these sera, and with sera from cases of laboratory infection and from inoculated persons, have yielded presumptive evidence that human cases of typhus can be classified by means of rickettsial agglutination into murine and epidemic types.

TABLE II—AGGLUTINATION OF RICKETTSIA AND PROTEUS BY SERA FROM VARIOUS SOURCES

Serum		Rickettsial agglutination		Proteus OX19
Source	Nature of infection or inoculation	Murine	Epidemic (Breinl)	
Guinea-pigs				
220	No infection	0 (20)	0 (20)	0
146	Convalescent murine typhus	640	80	—
71	Convalescent epidemic typhus (Tunis)	0 (20)	160	0
Rabbits				
121	Inoculated living murine yolk-sac. 1 dose IP	1280	160	—
41/42	Ditto. 3 doses IP	320	160	50
27	Inoculated living epidemic yolk-sac. 1 dose IP	80	320	—
39/42	Ditto. 3 doses IP	160	640	0
101	Inoculated formolised murine rickettsiæ. 3 doses IV	640	160	—
38/42	Inoculated formolised epidemic rickettsiae. 3 doses IV	640 (tr)	1280	—
Human				
S	Laboratory infection (murine) 14th day *	640	320	40
R	Ditto (epidemic) 12th day *	80	640	50
T	Middle East murine typhus 21st day †	2560	640	2500
Y	Middle East epidemic typhus 24th day †	1280	10,240	5000
P	Inoculated formolised epidemic rickettsiæ (Cox) 3 doses SO	80	640	80

* Cases in workers previously immunised with epidemic vaccine.

† Sera from Middle East sent by Major van Rooyen who isolated typhus strains, respectively orchitic and non-orchitic, from the blood.

IP = intraperitoneal. IV = intravenous. SC = subcutaneous.

The Irish cases of typhus were, on this basis, classified as infections due to epidemic rather than to murine rickettsiæ. Final proof must await the recovery of the causative organism in Irish typhus and study of its behaviour and serological structure.

DISCUSSION

Until recently the only laboratory method available for the differentiation of human typhus into epidemic and murine types was the classification by guineapig reaction of the strains of rickettsiæ recovered from the patients into non-orchitic and orchitic categories. Plotz (1943) showed by means of the complement-fixation reaction that rickettsial antigens could be used to demonstrate specific differences between the two species of rickettsiæ, and that the results with human sera indicated that Brill's disease was serologically related to epidemic rather than to murine typhus. The results of agglutination tests described above on sera from experimentally infected animals, and of absorption tests upon these sera, indicate that rickettsial agglutination is another possible method of demonstrating specific differences between *R. prowazeki* and *mooseri*. The application of these findings to human of typhus suggests that rickettsial agglutination can employed to differentiate epidemic and murine typhus and thus to throw light on the epidemiology of the disease.

The data indicate that the cases of typhus in Galway were due to *R. prowazeki*, and this agrees with the observation of McConn (1943) that the disease was louse-borne. As there had been no epidemic in this area since 1905, the incrimination of epidemic rickettsia as the causative organism of the recent outbreak raises the problem of the mode of survival of the organism in inter-epidemic periods.

In the first place, it appears impossible to rule out the occurrence of sporadic cases of typhus in Ireland in the inter-epidemic period. Mosing (1938) described the atypical character of epidemic typhus in Poland before the war and found that the Weil-Felix test often gave equivocal results in such cases. The essentially benign character of the Spiddal outbreak and the particular affection of children attending school certainly suggest that the population had been partially immunised by previous attacks of the disease.

Secondly, even in the absence of actual cases of the disease, rickettsiæ can remain viable in several ways. Zinsser's observations on Brill's disease (1934) showed that latent infection must at times follow an attack of the epidemic form of typhus in man, while in murine typhus the rat forms a similar reservoir of infection. There is however no proof that a human reservoir could give rise to an epidemic of typhus, for Mosing (1938) was unable to infect lice by feeding them on human typhus convalescents. Dried infected louse fæces which, are known to remain infective for long periods (Arkwright and Bacot 1923, Starzyk 1936, Fejgin 1936) might initiate an infection which could spread by lice and thus they provide a further mode of survival of rickettsiæ between outbreaks or sporadic cases.

SUMMARY

1. Rickettsial agglutination tests with sera from animals experimentally infected with typhus indicate specific differences between epidemic and murine rickettsiæ.

2. Human cases of typhus have been classified by means of rickettsial agglutination tests, and the recent cases in Galway have been found to belong to the epidemic serological type.

3. The bearing of these observations upon the epidemiology of the disease is briefly discussed.

The Irish sera were received by the courtesy of Dr. C. F. McConn, acting MOH for Galway, and Prof. R. A. Q. O'Meara of Trinity College, Dublin, to whom we wish to express our best thanks. Sera from the Middle East have been received by the kindness of Major C. E. van Rooyen, RAMC, and the courtesy of Colonel J. S. K. Boyd, OBE, DDP Middle East Forces. We wish to thank the Director of Pathology, Major-General L. T. Poole, DSO, MC, KHP, for providing facilities for the experimental work and for his never-failing interest.

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LECTURES ON POSTWAR RELIEF.—On Oct. 25 Dr. N. M. Goodman gave the first of these lectures which are being held at the Royal College of Nursing, 1a, Henrietta Place, London, W.1, on Mondays at 2.30 PM. Dr. Goodman spoke on health in Europe and other lecturers are to include Miss Evenson (matron-in-chief of the Norwegian nursing service), Miss Zaphiriou (Greece), Miss Paskuszova (Czechoslovakia), Nurse Godlowska (Poland), Mlle Janssens (Belgian Red Cross), Dr. Joles (Netherlands), and Prof. J. R. Marrack. Tickets for the lectures, which are open without fee to nurses of allied or enemy-occupied countries, may be obtained from the director of the education department at the college.

COSTOCLAVICULAR COMPRESSION OF THE SUBCLAVIAN ARTERY AND VEIN

RELATION TO THE SCALENUS ANTICUS* SYNDROME

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(*From a Military Hospital for Head Injuries*)

A number of views have been put forward as to the mechanism of the vascular disturbances produced in the arm by a cervical rib or sometimes by a first thoracic rib. *The purpose of this paper is to describe 3 cases in which* there was evidence of intermittent compression of the subclavian artery and vein between the clavicle and first thoracic rib. In order to elaborate certain observations made in these cases, a fourth is described with neurological disturbances only. Our observations indicate that the most common view which considers that these vascular disturbances are connected with spasm of the scalenus anterior muscle is not applicable to all cases.

CASE 1

A healthy well-built man, aged 28, in the middle of June, 1942, suddenly noticed pain and tinglings in the ring and little fingers and outer border of the thumb of the left hand while performing his accustomed canteen duties. That night *the pain kept him awake, forcing him to walk up and down* nursing his arm. Next day at times the whole hand felt numb below the wrist, at other times as the numbness was passing off he would have an intolerable aching pain in the hand which shortly disappeared when it became "alive" again. During the following few days the numbness, paræsthesiæ and pain lessened, but his left hand seemed weaker and colder than before. Often his hand would turn blue with the cold, though it never went white. He was given massage and physiotherapy with only slight benefit, and as improvement was delayed he was transferred to a military hospital on *Sept. 17, 1942.*

Examination showed slight wasting of the muscles of the left forequarter without specific wasting of any particular group. The left hand was colder and bluer than the right; this was confirmed by thermocouples which showed at room temperature a difference of 6° C. between the skin temperatures of the fingers of the two hands, a difference which diminished to a constant of 2·5° C. after the patient's trunk had been heated under a hot-air cradle for 2 hours. There was weakness of the forearm muscles, and a "glove" type of cutaneous sensory impairment to pinprick and cotton-wool [illegible] of the left [illegible] there was [illegible] of the two sides (chinizarin method, Guttmann 1940). On hyperextension of the neck (Adson and Coffey's manœuvre 1927) or on posterior abduction of the shoulders (Eden's manœuvre 1939) the pulsation of the brachial, radial and ulnar arteries disappeared in the left arm but not in the right. X rays of the neck showed no cervical rib but an asymmetrical thoracic inlet; the le[illegible] the right and its anterior end [illegible] f the left clavicle was higher [illegible]. The diagnosis made was scalenus anticus syndrome with involvement of the subclavian artery.

On Oct. 11, 1942, the lower part of the left posterior triangle of the neck was explored under local anæsthesia through an incision just above and parallel to the middle third of the clavicle. The external jugular vein was divided, the clavicular head of the sternomastoid muscle severed, and the posterior belly of the omohyoid muscle retracted upwards. After the phrenic nerve had been identified and retracted medially, the scalenus anterior muscle, the third part of the subclavian artery and the trunks of the brachial plexus were clearly defined. The patient was then asked to hyperextend his neck. The scalenus anterior muscle, which was of normal size, contracted vigorously but the pulsations of the third part of the subclavian artery were only very slightly diminished; the radial pulse, however, completely disappeared. [illegible]

first rib, revealing that there had been an appreciable interval between the scalenus anterior and medius muscles, in which the subclavian artery and brachial plexus had lain without compression or undue angulation. It was now apparent that there was a slight fusiform dilatation of the subclavian artery between the lateral border of the scalenus anterior muscle and the lateral edge of the first rib; the circumference of this *part of the artery was 5 mm. greater than in the second part.* The lower trunk of the brachial plexus crossed the rib behind it without tension. The patient again hyperextended his neck and again the radial pulse disappeared. This confirmed that the now divided scalenus anterior muscle had not been responsible for the arterial compression. During this manœuvre the space between the back of the clavicle and the outer edge of the first thoracic rib at the level of the subclavian artery narrowed down, nipping the forefinger inserted into it. This space was therefore measured with a series of instruments employed as "feelers"; with the arm lying *loosely by the side it measured 1·7 cm.*, whereas with the arm forcibly abducted in a posterior direction or with the neck extended it narrowed to 0·7 cm. These observations indicated that the subclavian artery was being nipped between the clavicle and the rib. A segment of rib 2·5 cm. long (indicated in fig. 1), with its periosteum, was removed from beneath the subclavian artery and brachial plexus, leaving a gutter into which these structures sank. Posterior abduction of the *shoulder now no longer affected the radial pulse. While the* rib was being resected an intravenous anæsthetic was given; durin [illegible] sulting in a [illegible] forward excep [illegible]

Ne [illegible] the left one n[illegible] of the neck [illegible] ss had also disappeared. The temperature of the left hand rose steadily, so that 4 weeks later the skin temperature readings were equal on the fingers of the two hands, both at room temperature and after heating. Oscillometry showed that the arterial pulsations in the left arm were still a little less vigorous than in the right arm, but were damped down only slightly on hyperextension of the neck or on bracing the shoulders back.

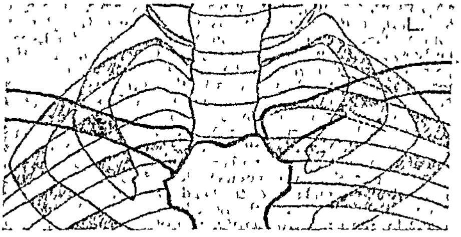

Fig. 1—Case 1. Tracing of radiogram showing asymmetry of thoracic inlet. The dotted lines enclose the resected part of the left first rib.

Comments.—In this case contraction of the scalenus anterior muscle either voluntarily or on faradic stimulation was not responsible for the obliteration of the radial pulse. The left subclavian artery was compressed between the outer edge of the first rib and the back of the [illegible] of the neck or by forcibly [illegible] This compression was [illegible] l of a segment of rib from beneath the subclavian artery. The ætiological factor leading to compression of the subclavian artery on the left side but not on the right was an asymmetry of the thoracic inlet.

CASE 2

A sedentary worker of slender build, aged 20, was admitted to a military hospital on Dec. 20, 1942. He had joined the Army 6 months before admission and soon found that after marching for more than 10 minutes his right hand would become numb and weak and tinglings would appear in the fingers. He experienced a similar sensation whenever he wore a heavy pack braced across his shoulders. He had never had any similar symptoms in civil life, nor had he had symptoms in his left hand. The only relevant fact in the past history was that he had fractured his left clavicle 14 months earlier.

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* In the modern terminology this muscle is known as the scalenus anterior.

The contours of the two arms were equal, and there was no evidence of wasting, weakness or sensory change. At rest the arterial pulses in each upper limb could be easily palpated, but every time he braced his shoulders backwards and downwards the pulsations of the brachial, radial and ulnar arteries on the right side instantly disappeared, whereas on the left side they were unaffected. During this manœuvre the third part of the right subclavian artery continued to pulsate vigorously. When the observer placed his index fingers above the middle third of the clavicle on each side, the interspace between the clavicle and first rib could be felt to narrow and disappear on the right side, but not on the left. In this case, contrary to what had happened in case 1, hyperextension of the neck had no effect on the pulses. X rays of the neck showed a symmetrical thoracic inlet without cervical rib, but the left clavicle was bowed forwards as a result of the old fracture. No differences were noted in the sweating responses of the two limbs, and the skin temperatures of the two hands were equal at room temperature and after heating.

From these observations there was strong circumstantial evidence of compression of the subclavian artery between clavicle and first rib. Further investigations were undertaken to confirm and elaborate that this was the only point of compression. The blood-pressure readings taken simultaneously with the arms loosely by the side were 118/75 mm. Hg on the right and 120/80 on the left. Oscillometric measurements of the arterial pulsations in the two arms confirmed that on backward and downward bracing of the shoulders the pulsations were arrested in the right arm, but were not affected in the left arm (table I). When the shoulders were kept braced backwards and downwards voluntarily for one minute the right upper limb became more cyanotic than the left, its superficial veins were more distended, and the patient complained of numbness of the hand; after five minutes the arterial pulse returned in the right limb in spite of sustained effort by the patient. The venous distension demonstrated by this manœuvre was further studied by infrared photography (figs. 2 and 3). This revealed that during this test collateral venous channels were being utilised. On the right side the basilic vein and other superficial veins of the arm drained via the superficial pectoral veins to the venous channels at the base of the neck, and not into the deep veins of the axilla as in the normal subject. It was thus evident that there was a venous obstruction as well as the arterial one, and it was presumed that the subclavian vein was being compressed by the same mechanism as the artery—an approximation of the clavicle to the first rib. The influence of the scalenus anterior in these manœuvres was then investigated by paralysing the muscle with an infiltration of 10 c.cm. of 1% procaine as advocated by Gage (1939). After complete paralysis of this muscle was obvious to palpation and had been confirmed by electromyography, the various manœuvres were repeated and obliteration of the arterial pulses and venous engorgement were again found to occur on the right side.

TABLE I—OSCILLOMETRY IN CASE 2 (PACHON OSCILLOMETER)

Pressure in mm. Hg	Oscillometric index		Pressure in mm. Hg	Oscillometric index	
	With arms at rest	With shoulders braced backwards		With arms at rest	With shoulders braced backwards
Right arm			*Left arm*		
100	5	0	100	4½	3½
80	4	0	80	3	2
60	1½	0	60	1	½
40	½	0	40	½	½

Operation was then considered, but was thought to be unwarranted. The symptoms appeared only when the patient was marching or carrying a heavy pack. Moreover, he had finished his preliminary training and was returning for *non-combatant duties to a unit where it was clear that he could perform his work satisfactorily without symptoms.*

Comments.—In this case there is strong evidence of a [illegible] of both the right subclavian artery and vein [illegible] the clavicle and first thoracic rib during backward and downward bracing of the shoulders. The right scalenus anterior muscle was proved to have no influence on the compression of the artery and vein during this manœuvre. The left subclavian vessels were probably spared owing to the forward bowing of the clavicle resulting from a previous fracture.

CASE 3

A member of the WAAF, aged 22, was admitted to a military hospital on Dec. 17, 1942, complaining of clumsiness of the left hand for a year. The hand always felt cold. For the previous 4 months she had noticed pins and needles extending down the inner border of the forearm to the tips of the medial two fingers whenever the arm hung by her side. These paræsthesiæ were relieved by elevation of the limb.

Examination showed well-marked weakness and wasting of the intrinsic muscles of the left hand and ulnar side of the forearm, with gross wasting of the opponens and abductor pollicis muscles of the type described by Wilson (1912) as often associated with cervical rib. Electromyography showed numerous fibrillation action potentials in these two muscles and no motor unit activity; in the remaining hand muscles there were no fibrillation action potentials but reduced *motor unit activity, which suggested a nerve block without* structural damage. There was slight impairment of sensibility to pinprick and cotton-wool over an ill-defined area comprising all fingers and the ulnar border of the left forearm. There was spontaneous sweating on the palms of both hands, *left more than right, and after heating a relative hypohidrosis* over the whole left little finger. Both hands were cold but showed equal skin-temperature readings, at room temperature and after heating. X rays of the thoracic inlet showed bilateral rudimentary cervical ribs; the left measured 3 cm. and the right 2·2 cm. ('Precision' stereoscope of Caldwell and Molly). The thoracic inlet formed by the first thoracic ribs was asymmetrical; as in case 1 the left first rib appeared shorter and less oblique than the right, and its anterior end together with the medial end of the left clavicle was on a higher level. An attempt was made to measure radiologically the interspaces between the clavicle and first rib in the region of the groove for the subclavian artery with the precision stereoscope. It proved technically impossible to identify accurately the nearest opposing points on the two bones to ensure an absolute measurement. An estimate of the space between the upper border of the clavicle and the outer edge of the first rib at rest was 1·4 cm. on the left and 1·7 cm. on the right. After hyperextension of the neck it narrowed to 1 cm. on the left and 1·2 cm. on the right. These figures confirmed the asymmetry of the thoracic inlet and indicated that the space between rib and clavicle was narrow.

On hyperextension of the neck, or on backward and downward bracing of the shoulders, the pulsations of the brachial and radial arteries of the left arm disappeared. On the right side the corresponding arterial pulsations as measured by oscillometry diminished but did not disappear. There was evidence of intermittent venous obstruction on the left side similar to that in case 2 after both shoulders had been braced backwards for a minute, and this was confirmed by infrared photography. The clinical picture was thus one of neurological disturbances without persistent vascular changes.

At operation on Jan. 19, 1943, the scalenus anterior muscle, subclavian artery and brachial plexus on the left side were explored under local anæsthesia by an approach similar to that employed in case 1. During backward and downward bracing of the shoulders and hyperextension of the neck the scalenus anterior muscle contracted, the pulsations of the third part of the subclavian artery diminished perceptibly, and the radial pulse disappeared. The interspace between rib and clavicle at the level of the subclavian artery was estimated as in case 1: at rest it measured 1·8 cm.; when the shoulders were braced backwards and downwards it narrowed to 0·6 cm. Opposite the subclavian vein there was at rest an interval of 0·6 cm.; on backwards and downwards bracing of the shoulders this narrowed to less than 0·4 cm. Next the scalenus anterior muscle was stimulated with a powerful faradic current and its vigorous contraction was accompanied by complete disappearance of the pulsations of the third part of the subclavian artery. It was also noticed that the lower trunk of the brachial plexus, with the second part of the subclavian artery interposed between it and the contracting scalenus anterior muscle, was being compressed against the tip of the cervical rib. An intravenous anæsthetic was then given and the scalenus anterior divided above the first rib. *The lower trunk of the brachial plexus was seen to*

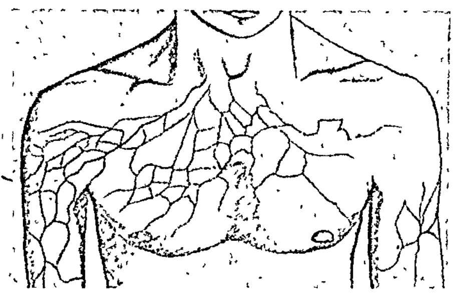

Fig. 2—Case 2. Tracing of infrared photograph taken with shoulders at rest.

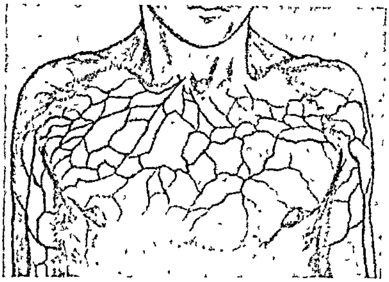

Fig. 3—Case 2. Tracing of infrared photograph with shoulders braced backwards and downwards, showing distension of superficial arm and pectoral veins on the right side

be surrounded by a thickened fibrous sheath in the region of the tip of the cervical rib and neck of the first thoracic rib; here it rested on a dense layer of fascia passing downwards from the cervical rib. The anterior portion of the cervical rib was then excised, relieving the pressure on the lower trunk of the brachial plexus. Finally the lower trunk of the plexus was dissected out of its thickened adventitial sheath. After freeing it appeared normal.

The postoperative result was satisfactory. There was immediate subjective and objective improvement in the power and dexterity of the left hand and a diminution of the sensory changes. Three weeks later electromyography showed normal motor unit activity in most of the intrinsic hand muscles in addition to fibrillation and the reappearance of a few motor unit action potentials in the opponens and abductor pollicis muscles. After heating there was now hypohidrosis only over the tip of the left little finger, while the sensory disturbance had disappeared. However, on backward and downward bracing of the shoulders the pulsations of the brachial and radial arteries of the left arm still disappeared, and venous congestion in the pectoral region again became apparent; but hyperextension of the neck no longer affected the arterial pulses. It had been observed at operation that there were two points at which the subclavian artery was being compressed—between the scalenus anterior and the apex of the cervical rib, and between the clavicle and first thoracic rib. Since an adequate cause of the dominating neurological features had been found and dealt with by removal of the tip of the cervical rib, this lower interspace was nor[illegible] ymptoms attributable: [illegible] t that after operation [illegible] backward bracing of the shoulders but not on hyperextension of the neck shows that the scalenus anterior muscle, which had been divided, played no part in the first manœuvre though it did in the second.

Comments.—The neurological features observed were due to compression of the lower trunk of the brachial plexus against the tip of a small cervical rib. Contractions of the scalenus anterior muscle played a part in maintaining this compression. The left subclavian artery was being compressed intermittently at two places—between the scalenus anterior and the tip of the cervical rib, and between the clavicle and first thoracic rib. After division of the scalenus anterior muscle, compression of the left subclavian artery and vein between the clavicle and first thoracic rib persisted on backward and downward bracing of the shoulders but not on hyperextension of the neck. On the right side there were no vascular disturbances. Oscillometry indicated only a partial obstruction of the subclavian artery on backward and downward bracing of the shoulders on this side. The asymmetry of the thoracic inlet would account for the greater compression of the left subclavian artery.

CASE 4

[illegible] neurological abnormalities, wa[illegible] ital on Dec. 16, 1942 with 17 [illegible] and numbness of the ulnar 1½ [illegible] weakness and wasting of all the intrinsic muscles including the thenar muscles. There was a zone of diminished cutaneous sensibility over segmental areas C8 and T1, greater to pinprick than to cotton-wool, suggesting a nerve root as opposed to a peripheral nerve lesion (Weddell 1941). Sweating tests showed a slight delay in secretion in response to heating along the ulnar border of the left forearm and hand. Electromyography showed fibrillation action potentials and diminished motor unit activity in all the intrinsic hand muscles, indicating slight lower motor neurone denervation. All muscles responded normally to faradism. No diminution in the pulsations of the brachial or radial arteries was observed in the arms on either hyperextension of the neck or backward and downward bracing of the shoulders. X rays of the neck showed enlarged transverse processes on the 7th cervical vertebra but no cervical ribs; the thoracic inlet was symmetrical. The case therefore appeared to be one of "scalenus anticus syndrome" with neurological changes from involvement of the lower trunk of the brachial plexus.

At operation on Jan. 12, 1943, through an exposure similar to that employed in cases 1 and 3, the only abnormal finding was a taut tendinous band about 6 mm. wide by 1 mm. thick, probably representing the scalenus minimus of Albinus (Jones 1911), which passed downwards from the transverse process of the 7th cervical vertebra to be inserted into the inner border of the first rib between the subclavian artery and the first thoracic nerve root. It compressed the lower trunk of the plexus against the neck of the first rib. It was divided and a groove was noted in the nerve trunk at the point of compression. On passive hyperextension of the neck the scalenus anterior muscle, which was left intact, did not compress either the subclavian artery or the lower cord of the brachial plexus. The interval between the clavicle and the first rib at the level of the subclavian artery was not less than 1·8 cm. after the shoulders had been pushed firmly backwards and downwards.

After the operation the muscle weakness and sensory changes immediately disappeared as far as could be determined clinically. In addition, the muscle wasting rapidly disappeared and within a month was no longer perceptible. Electromyography now showed vigorous motor unit activity; but the fibrillation action potentials were still present and the slight disturbance of sweat secretion noted before operation ha[illegible]

[illegible] observed in this ca[illegible] lower trunk of the br[illegible] a tendinous band, di[illegible] inical cure. They we[illegible] scalenus anterior mu[illegible] operation. There were no signs suggesting compression of the subclavian artery and vein, and at operation there was not sufficient approximation of the clavicle to the first rib on manipulation of the shoulder to cause compression of the subclavian vessels.

TESTS IN NORMAL SUBJECTS

The four cases demonstrate the value of testing the effects of postural manœuvres of the shoulder girdle on the arterial pulsations of the limb as a diagnostic measure when costoclavicular compression of the subclavian vessels is suspected. To assess the frequency with which the subclavian artery can be compressed in normal subjects we performed these postural manœuvres in 50 men and 50 women aged 19–47 years, chosen at random from the staff and convalescent patients of a military hospital. Table II summarises the main findings. The radial pulse was affected on one or both sides by these manœuvres in 25 of the men and 30 of the women, being obliterated in 18 and 19 respectively. The condition was bilateral in 62 subjects. The pulses were more often affected by backward and downward bracing of the shoulders (54 subjects) than by hyperextension of the neck (20 subjects), and in only one instance (a woman) were the pulses affected by the latter manœuvre when the former had been without effect. Few of the subjects complained of symptoms, but several women volunteered that they were liable to chilblains on their hands or fingers in cold weather, and so each subject was specifically asked about this. Of 45 persons whose pulses were not affected, only one complained of chilblains on the hands; 14 women and one man who suffered from chilblains on both hands had some bilateral alteration of the pulses. Moreover, of 11 women in whom the pulse was involved on one side, 3 who complained of chilblains had them on the affected side only. These observations suggest that costoclavicular compression may be one of the predisposing causes of chilblains in the hands, but it obviously cannot be the basic cause because it does not explain chilblains in other parts of the body. Other symptoms, short of obliterative arterial disease, which may be shown in mild cases are transient numbness and tinglings in the hands and fingers while the arm is actually in the position which compresses the artery. This may be occasioned by carrying heavy weights, or in the Services by marching with full pack.

TABLE II—EFFECT OF FORCED POSTURES ON THE RADIAL *PULSES OF NORMAL PERSONS*

	On backward and downward bracing of shoulders	On hyperextension of neck	On either manœuvre	Subject to chilblains on hands
50 men				
No effect on pulses	25	41	25	1
One or both radial pulses diminished only	7	1	7	0
One or both radial pulses obliterated	18	8	18	1
50 women				
No effect on pulses	21	39	20	0
One or both radial pulses diminished only	11	7	11	2
One or both radial pulses obliterated	18	4	19	12

DISCUSSION

Eden (1939) has surveyed the chief theories concerning the origin of vascular complications of cervical ribs and first thoracic rib abnormalities. He described three cases (including one reported by Lewis and Pickering in 1934) with obliterative arterial disease affecting the distal arteries of the limb, in which it was shown at operation that the subclavian artery was being compressed between the clavicle and first rib when the arm was abducted. In addition he tabulated 45 published cases of cervical rib or first thoracic rib abnormalities with vascular complications; from an analysis of these he suggested that the vascular disturbances resulted from direct injury to the subclavian artery. Eden then elaborated the hypothesis, first advanced by Lewis and Pickering (1934) that at the point of trauma an intimal thrombus may form in the damaged artery, and that the phenomena of obliterative arterial disease, such as "Raynaud attacks" in the fingers, obliteration of one of the distal or main arteries of the limb, and ultimate gangrene, are the result of emboli dislodged into the blood-stream from this mural thrombus. Eden advocated that enough of the offending rib should be removed to allow the artery to pass freely beneath the clavicle without compression, and pointed out that division of the scalenus anterior muscle alone is often insufficient to prevent further trauma.

The vascular changes in our 3 cases were less severe than those reported by Eden; only in case 1 was there evidence of obliterative vascular changes. In this case the skin temperature of the left hand was considerably lower than on the right side, and the difference persisted after heating, indicating that vasospasm was not responsible. In cases 2 and 3 there was no evidence of obliterative vascular changes resulting from intermittent compression. In case 3 the vascular changes were overshadowed by the neurological features, but in case 2 there were periods of numbness and paræsthesiæ in the hand which were directly referable to the intermittent compression of the main artery. If this compression had been allowed to persist unchecked, signs of obliterative arterial disease increasing in severity would probably have eventually appeared in this case. The importance of early recognition of this condition therefore becomes apparent.

Approximation of the clavicle to the first rib can compress not only the subclavian artery but also the subclavian vein. This was clearly shown in cases 2 and 3 when backward bracing of the shoulders for one minute led to distension of the superficial veins of the limb with the opening up of collateral venous channels across the pectoral region to the deep veins of the neck. This phenomenon was not looked for in case 1. It has been previously recorded by Adson and Coffey (1927) in a case of cervical rib showing vascular changes and was considered by them to be due to sympathetic dysfunction.

More than one postural manœuvre involving the shoulder girdle may result in compression of the subclavian vessels. The movement which does this most constantly is backward and downward bracing of the shoulders, but hyperextension of the neck, as described by Adson and Coffey (1927) will also do it in a proportion of cases. Backward and downward bracing of the shoulders is the motion which most directly approximates the clavicle to the first rib (fig. 4). Hyperextension of the neck probably also narrows the angle between the first rib and the clavicle. In this manœuvre the scalene muscle may play a part as an elevator of the anterior end of the first rib. In 62% of the normal persons examined by us costoclavicular compression of the subclavian vessels was a bilateral phenomenon. However, in cases of cervical ribs or first thoracic rib abnormalities with vascular symptoms which have been described, symptoms and signs seem to be more pronounced on one side. This may be due (as was clearly shown in *cases* 1 and 3) to asymmetry of the thoracic inlet leading to a narrower interspace between clavicle and first rib on one side than on the other. It is interesting to note that in case 2 a previous fracture had altered the contours of the left clavicle, increasing the interspace on that side.

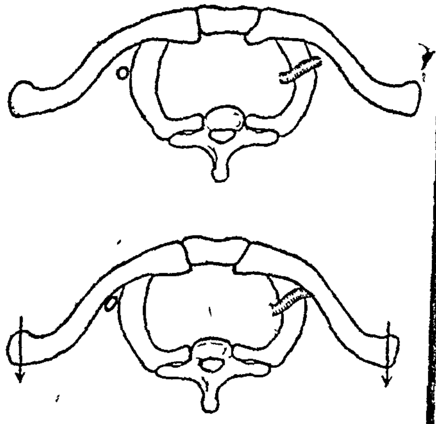

Fig 4—*Diagrams illustrating mechanism of costoclavicular compression of subclavian artery on backward and downward bracing of shoulders*

Symptoms of obliterative arterial disease due to cervical rib or first thoracic rib abnormalities are rare. Eden in 1939 collected only 48 published cases. But our experience in the Services suggests that mild vascular symptoms referable to these rib abnormalities are more frequent than has been suspected. (We have seen 6 cases with mild vascular symptoms in 8 months.) Two factors probably account for this. Most persons in the Services are subject to greater physical stress involving their shoulders than in civil life, and they also report to their medical officers when symptoms first appear, long before the stage of obliterative arterial disease (case 2).

Among the older hypotheses concerning the mechanism of the vascular changes in the arm which were discussed by Eden were those of Murphy (1905), Todd (1913), Leriche (1935), Telford and Stopford (1931), and Blair Davies and McKissock (1935). Murphy held that the subclavian artery was compressed between the scalenus anterior muscle and the rib, while the others believed that nervous factors were responsible for the vascular changes through sympathetic nerve dysfunction. Eden brought forward evidence against the concepts of sym- [illegible] did not refer to the many recent [illegible] view that the artery might be [illegible] scalenus anterior muscle and the rib, or that the scalenus anterior itself plays a major part in the production of symptoms. Advocates of the "scalenus anticus syndrome" associated with either cervical rib or first thoracic rib abnormalities (Adson and Coffey 1027, Ochsner, Gage and DeBakey 1935, Naffziger and Grant 1938; and many others) recognise two main groups of cases—those in which vascular disturbances are prominent and a larger group in which neurological features predominate. For both groups division of the scalenus anterior muscle is recommended. Undoubtedly in some cases division of this muscle is followed by improvement or recovery, but this is not true of all cases which come under this diagnosis. Thus in our first 3 cases the vascular phenomena persisted even after the scalenus anterior had been divided, or paralysed by local anæsthesia. A striking instance was Eden's third case, in which two operations had to be carried out. At the first operation the scalenus anterior was divided without benefit; at the second a portion of the first rib was removed with consequent improvement in symptoms. Case 4 shows that the scalenus anterior is not always responsible for the neurological abnormalities, [illegible] of nerve trunk [illegible]

In addition [illegible] scalenus anter[illegible] there are two other features found in many cases with vascular symptoms which cannot be satisfactorily [illegible] scalenus ante[illegible] explain this [illegible] sympathetic irritation results from pressure of the rib on the lower trunk of the brachial plexus and gives rise to peripheral vasospasm. [illegible] have been put forward [illegible] feature, which hitherto ha[illegible] that many cases of aneur[illegible] of the third part of the subclavian artery have now been described in relation to cervical ribs. Such authorities as Halsted (1010) and Matas (1935) have laboured hard to explain their occurrence distal to the presumed point of obstruction of the artery behind the scalenus anterior. All these hypotheses, [illegible] *it is accepted that the* [illegible] clavicle and first thor[illegible] the subclavian artery.

Without the postural manœuvres described, the intermittent arterial obstruction in our cases would have passed unnoticed. It is therefore recommended that they be employed in all cases of obscure vascular disturbance in the upper limbs. It must be remembered that these movements obliterate the pulses in a considerable proportion of normal people (see table II). A positive result should therefore only be considered significant when other causes of vascular disturbance have been excluded. The presence or absence of scalenus anterior spasm can be confirmed by repeating the tests after paralysing the muscle with a local anæsthetic. Valuable additional tests are afforded by oscillometry and skin temperature *determinations.*

[illegible] pression of the [illegible] of the vascular [illegible] us syndrome" [illegible] se 2), Naffziger [illegible] es designed to strengthen the shoulder girdle and [illegible] en the gravitational drag of the upper limb on the trunk. They reported that improvement in posture is often followed by benefit and even complete relief. It is difficult to conceive how these exercises can relieve a scalenus anterior compression, but since they may relieve a costoclavicular compression it is more probable that it was the latter mechanism which operated in their successful cases. Following Naffziger and Grant's results we recommend remedial exercises in cases with mild vascular symptoms; in cases with neurological disturbances early exploration is essential if complete recovery is to be obtained (see case 4). Surgical treatment is indicated whenever features of obliterative arterial disease are present. The operation should primarily be exploratory, for the site of the compression of the subclavian artery must first be ascertained. This part of the operation is preferably done under local anæsthesia. If the artery pulsates vigorously lateral to the scalenus anterior muscle, especially while the muscle is contracting during faradic stimulation, it should be observed whether the tip of the forefinger is nipped in the interspace between rib and clavicle when the shoulder is braced backwards or downwards. If a compression is demonstrated at this level only, the essential part of the operative procedure should be the removal of a segment of the rib from beneath the artery. During this stage of the operation intravenous or inhalation anæsthesia can be given. It is preferable to remove the periosteum so as to prevent regeneration of the rib, but technically this may be difficult and incurs the risk of pneumothorax. Division of the scalenus anterior alone may be insufficient to relieve the compression, as was shown in our first and third cases and in Eden's third case.

SUMMARY

Three cases of vascular disturbance in the upper limb due to compression of the subclavian artery and vein between clavicle and first thoracic rib are described. In one of these in which cervical ribs were demonstrated the subclavian artery was being compressed at two places—between the scalenus anterior muscle and the apex of the cervical rib; and between the clavicle and first rib. In a fourth case, which showed neurological disturbances only, the subclavian vessels were not compressed, and relief was obtained by section of a fibrous band compressing C8 and T1 nerve-roots without division of the scalenus anterior.

Costoclavicular compression of the subclavian vessels can be recognised by observing the effect of postural manœuvres of the shoulder girdle on the arterial pulses of the limb. Backward and downward bracing of the shoulders is the movement which obliterates the pulses most readily.

The subclavian vessels can be compressed by these [illegible] normal subjects. Symptoms [illegible] easily provoked, and [illegible] *at an early stage* features of obliterative arterial disease may supervene. Symptoms range from cold blue hands with a tendency to chilblains in the mildest group of cases to "Raynaud attacks," arterial thromboses and even gangrene in the more severe cases.

In the past these cases have been confused with those of the "scalenus anticus syndrome." They may be differentiated by paralysing the scalenus anterior muscle with a local anæsthetic.

In milder cases benefit may be obtained by remedial exercises designed to increase the postural tone in the muscles of the shoulder girdle. In more severe cases operation is required, and is best begun under local anæsthesia. The site of compression of the subclavian artery between clavicle and first rib is demonstrated by *getting the patient to brace his shoulders backwards and* downwards. In positive cases the tip of the forefinger is nipped between the clavicle and the rib and the radial pulse disappears. When a compression at this level is present, the essential part of the operation is removal of a segment of the offending rib from beneath the artery, for division of the scalenus anterior muscle alone may be ineffective.

We are indebted to Lieut.-Colonel G. O. Chambers, RAMC, [illegible] to publish this paper; [illegible]

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CHRONIC FLEXNER DYSENTERY TREATED WITH SUCCINYLSULPHATHIAZOLE

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SEVERAL reports from this country and America have established sulphaguanidine as a potent remedy in the bacillary dysenteries. Its value in surgical diseases of the gastro-intestinal tract is limited owing to the drug being "too readily absorbed . . . giving rise to frequent and severe reactions," and being "ineffectual in the presence of ulcerating lesions of the bowel." Poth and others[1] investigated a number of sulphonamide compounds with the object of finding one which overcame these limitations. Succinylsulphathiazole ('Sulphasuxidine') was eventually chosen because its absorption was slight (about 5% excreted by the kidneys), severe toxic reactions were not encountered, and it drastically reduced the number of coliform bacilli in the stools (in some instances to zero).[2] The few papers available indicate that the new compound is as efficient as sulphaguanidine in the treatment of Shiga, Flexner and Sonne dysenteries, if not more so. Its mode of action is as yet unexplained, although it may depend on the liberation of free sulphathiazole, inhibited from absorption by the succinyl radical. Poth's suggestion that it leads to "a high local concentration of . . . nascent sulphathiazole in intimate contact with the organism" is purely speculative.

In the case described below, the dosage of the drug was approximately that recommended[3 4]—namely, 0·25 g. per kg. body-weight a day.

A female chronic schizophrenic, aged 36, who enjoyed indifferent health, developed pyrexia with frequent relaxed slimy stools on Nov. 10, 1941. No blood was passed. The acute symptoms lasted for a few days and gradually subsided. On Dec. 12 a report on the stools was positive for Flexner's dysentery. There was a recurrence of diarrhœa without pyrexia in February and March, 1942, and on repeated examination of the stools some of them still showed Flexner's bacilli. A course of sulphaguanidine was began on March 25, 1942, the initial dosage being 9 g. a day. Because of occasional diarrhœa persisting during the therapy, the drug was continued for a month, 126 g. being administered in all. For the next 3 months the diarrhœa was considerably checked, but the patient continued to excrete the bacillus off and on. A second course of sulphaguanidine was begun on July 5, 1942, 60 g. being administered in 7 days. Intermittent diarrhœa persisted and the organism continued to be excreted. Further 7-day courses of sulphaguanidine were administered, beginning on Aug. 15, 1942 (46 g.) and on March 6, 1943 (50 g.), but they were ineffective. On April 27 a 7-day course of succinylsulphathiazole was begun, 9 g. being given each day, divided into three equal doses. The patient's diarrhœa then ceased, her general condition notably improved and the stools have been consistently negative for Flexner since.

This was a striking result. Here was a chronic dysenteric, who had diarrhœa and positive stools on and off for nearly 18 months before sulphasuxidine therapy was instituted. Sulphaguanidine had been tried on four separate occasions without success. Yet after a single course of succinylsulphathiazole her symptoms cleared and the stools became negative for the dysentery bacillus. As far as we are aware, no similar case has yet been reported, although Kirby and Rantz[5] report success in the treatment of 5 dysentery carriers; unfortunately they give no details of these in their paper.

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Reviews of Books

A Pocket Surgery

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WRITING for Service medical officers, the authors have compressed many useful facts into this small manual of surgery. Thoughtful selection and terse phrasing have enabled them to cover a wide field, important and everyday conditions (such as acute abdominal disease and swellings of the scrotum) being fully and clearly dealt with, while less common problems are outlined in a few apt words. Naturally such brevity occasionally misinforms: they cannot surely believe that nuclear prolapse is so often the cause of sciatica as their text seems to indicate, nor that spontaneous rupture of a pelvic abscess is preferable to its treatment by timely incision, either through the abdomen or via the rectum. Nor do they explain why they think early diagnosis of pregnancy is unnecessary and that the Aschheim-Zondek test need never be done under existing conditions; service officers find the former necessary and difficult, and the latter remarkably useful. They rightly advise against medical students using this volume as a "cram book," but service medical officers would do well to carry it about with them. It will be specially welcome to those who find the surgeon's knife in their hands either for the first time or after long abstinence.

Social Service in the Clinic for Venereal Diseases

(2nd ed.) DOROTHY MANCHÉE. (*Baillière. Pp.* 117. 5*s.*)

THE second edition of Miss Manchée's book follows the lines adopted in the original edition, but is brought up to date by a detailed description of Regulation 33B and reference to the Adoption of Children (Regulation) Act which came into force as recently as last June. Other information in the appendix includes the location and hours of treatment centres, and the addresses of agencies and organisations to which application may be made for the various forms of assistance which the venereal patient may require to facilitate continued attendance at the clinic. The book will prove useful to those who are interested in social service in general, and may assist the young almoner to decide to specialise in the varied duties which may fall to her lot if appointed almoner to a VD clinic. That these duties differ considerably from those of the almoner of a general hospital is made clear, and the human interest of her work is emphasised as well as the patience, perseverance and tact it calls for. It is to be hoped that this little book may encourage the appointment of almoners in all the larger VD centres, and help to bring forward for training sufficient women suited to the task.

Medical Practice

British Encyclopædia of Surveys and Abstracts 1942–43; Cumulative Supplement. Editor: SIR HUMPHRY ROLLESTON, Bt., MD CAMB., FRCP. (Butterworth. Pp. 342, 382. 35*s.*)

THE new volume of the encyclopædia and its cumulative supplement reflect their usual credit on editor and publishers. The critical surveys by seventeen distinguished contributors summarise the year's advances in a wide medical and surgical field, and the abstracts of current published work are able and informative. The supplement, which replaces its predecessors, brings up to date the accounts of disease set out in earlier volumes. Together they are one answer to the busy practitioner's query "How am I to keep my knowledge of medicine up to date?"

MAJOR FALCONER, CAPT. WEDDELL: REFERENCES (*cont.*)

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THE LANCET

LONDON: SATURDAY, OCTOBER 30, 1943

OUTPATIENTS FIRST

THE last twenty years have seen a steadily increasing demand by the public for those elaborate methods of investigation and treatment that cannot be economically supplied outside large hospitals. In conequence hospital authorities in many districts have been faced with lengthening lists of patients awaiting dmission. To meet this situation many voluntary ospitals have built new wards, or enlarged old ones, nd many municipal authorities have increased and mproved the accommodation previously provided n the buildings of the old workhouse infirmaries. These measures were expensive and also involved ncrease of kitchen, heating and other domestic acilities, and quarters for the additional nursing and dministrative staff required. Yet when the extenions were finished, there was no great or lasting eduction of the waiting-lists; for the patients were mostly seeking specialised service, particularly from the pathological or radiological departments, and these had seldom been enlarged. The bottleneck was in he special departments, and often enough the new beds were occupied by patients merely waiting for diagnosis

There are many indications that the demand for pecialist investigation in hospital will rise after the war. At the least, some extension of the National Health Insurance may be expected, and its benefits are likely to include consultant service. In such circumstances it will not be easy for the family doctor o refuse a note of reference to a hospital if the patient wants it, even though he may think it unnecessary. The public is well aware of the uses of radiography in the diagnosis of dyspepsia and pulmonary disease. A growing proportion of the profession have been trained in places where special tests are readily available and later tend to rely on them greatly—some say excessively. Again, the reports of the professional defence societies and the newspaper publicity given to errors in diagnosis emphasise the need for special investigations, and the risks of omitting hem.

In planning for the future these tendencies and the lessons of the past need to be borne in mind. It is uneconomical to admit a patient to the general wards of a hospital if he requires no more than board and lodging while investigations are made. Hitherto this has been done simply because there was no alternative, but it means that routine duties connected with the admission, feeding and discharge of minor cases distract the attention of the nursing staff from the care of the acutely sick. Even when these cases are dealt with as outpatients it often happens that the routine work of the main departments is held up by unexpected arrivals, who have to wait their turn in lobbies improvised in the corridors and landings of the hospital. The position is likely to become still worse if the old mistakes are repeated in hospitals built on the outskirts of large towns, or as centres to serve large areas. More patients may then travel longish distances and need to remain overnight. If the general wards are the only place available for them these wards will be further congested.

The right solution seems to be the provision of outpatient blocks at all large hospitals. Compared with existing outpatient departments, they should be far more fully equipped in technical apparatus, staff and accommodation for patients. Besides the standard waiting-rooms, consulting-rooms, and theatres for minor operations, there should be a branch of the main pathological laboratory of the hospital, capable of dealing on the spot—and in quantity—with such routine tests as blood-counts, blood-sugar estimations, simple staining, and the preparation of cultures and specimens; for there will surely be large follow-up clinics for diabetes and blood diseases at least. Similarly there should be an outpatient X-ray department, staffed by technicians and capable of taking routine films to be interpreted by the specialists. A secretarial staff, to deal immediately with letters to the patients' doctors, while the particulars of the case are still fresh in the consultant's mind, is an ideal that many have dreamed of, but few enjoy. For those patients who have to stay a few hours, there should be comfortable waiting-rooms, and a buffet where cheap meals can be had. Finally there should be a hostel for those who must be detained for a night or two but who do not need special nursing; this should have single bedrooms, or small wards, with central dining and recreation rooms. Such procedures as radiography of barium meals, pyelography, and surface application of radium could be carried out on patients resident in such a hostel. Again, those who have had minor operations could be kept for the night, and relatives of the dangerously ill, or of young children, could also stay there if they came from a distance. After these tests were finished, or the short postoperative period passed, the patients could again see their original outpatient consultant before returning to their homes. Only a small minority would have to be admitted to the main wards of the hospital. The members of the staff in charge of outpatients would have the satisfaction of dealing personally with the great majority of the cases sent them; they would no longer have to transfer them to the beds of their senior colleagues in charge of the main hospital wards. The outpatient block would require only a comparatively small nursing staff to deal with tests and dressings, for the administrative work of seeing that patients keep their appointments, and of guiding them to the special departments, could be perfectly well dealt with by a lay staff. The health propaganda service for the region would find such a centre a profitable field for its endeavours; it would give them a chance to strike while the iron was hot. A representative of the hospital almoner's department, or citizen's advice bureau, should be provided with an office in the building.

In a hospital with an enlarged outpatient department of this kind the turnover of patients would be much increased and their overhead cost correspondingly reduced. The public would receive a quicker and a far more convenient service than has hitherto been rendered by most institutions. The provision of convalescent homes and rehabilitation centres, so that the patients' stay in the general wards is reduced to a minimum, is a complementary solution—though that is another story. Hospitals faced with a long or growing waiting-list, and those planning for the future, will do well, we believe, to consider carefully whether they cannot meet the needs of the public in one or both of these ways more economically than by providing additional beds.

PROGRESS WITH PENICILLIN

THE American report[1] on 500 cases treated with penicillin under the direction of a committee of the National Research Council brings out the drug's potentialities in a variety of infections, particularly those that seemed most likely to arise among the armed forces or were resistant to sulphonamides. These included generalised and localised staphylococcal infection, pyogenic meningitis and empyema, pneumococcal pneumonia, sulphonamide-resistant gonorrhœa, and subacute bacterial endocarditis. The purified drug, standardised to the Oxford unit, was given intravenously, intramuscularly or locally, cases of empyema and meningitis being treated by injections into the pleural cavity or spinal canal. For the intravenous route, injections containing not more than 1000 units per c.cm., or a continuous drip of penicillin dissolved in saline or 5% glucose, were used at the rate of 5000–10,000 units per hour. For intramuscular injections, given every 2–3 hours, a concentrated solution of penicillin, usually equivalent to 5000 units per c.cm., was used. Adequate or optimum dosage has not yet been clearly defined, and seems to vary considerably with different patients and different infections. The objective must be to maintain a concentration in the blood sufficient to inhibit the growth of the infecting organism. Repeated estimation of the bacteriostatic power of the patient's serum against either the particular infecting organism or a standard culture of staphylococcus or streptococcus can best be made by FLEMING'S[2] slide-cell technique, which is not difficult to master and requires only minimal amounts of blood such as can be obtained by finger or ear puncture. Adequate dosage may also be assessed by the patient's clinical response, and here change in the constitutional symptoms is at least as important as improvement in the temperature and pulse. It was found that in the normal person penicillin given intravenously or intramuscularly does not reach the spinal fluid; so, as FLEMING discovered, the drug must be given both intrathecally and intramuscularly for the effective treatment of meningitis.

At first sight the results in the American series are disappointing. Of 91 patients with staphylococcal bacteræmia, 34 died and 3 showed no improvement. This 40% failure in generalised staphylococcal infection is partly explained by inadequate dosage in cases treated early in the series, and by the inclusion of 9 cases of staphylococcal endocarditis, 3 cases of bilateral suppurative pyelonephritis and 3 cases with extensive burns. It emphasises the need for early diagnosis with immediate and adequate treatment, which may mean a total dosage of half a million to a million units over 7–14 days. Among localised staphylococcal infections excellent results were obtained in osteomyelitis; exudate quickly dried up, sinuses healed and chronic lesions disappeared in a few weeks. Even more striking was the rapid improvement in 7 out of 9 cases of staphylococcal empyema after a few days' local injections totalling 40,000–50,000 units of penicillin. Of 23 patients with severe hæmolytic streptococcus infection that failed to respond to sulphonamides, 13 recovered or improved, 7 died and 3 were unaffected. The results in anaerobic and non-hæmolytic streptococcus infections were less satisfactory, while penicillin in doses ranging from 240,000 to 1,760,000 units failed with one possible exception to cure 17 cases of bacterial endocarditis. However, the committee hold out some hope from early and prolonged treatment of cases infected with the more susceptible strains of *Streptococcus viridans*. Pneumococcal pneumonia responded well, often to remarkably small doses (100,000 units or less), but only 7 of 23 cases of pneumococcal meningitis recovered; it is only fair to add that not all of these were treated intrathecally. The cure of 125 out of 129 cases of sulphonamide-resistant gonorrhœa within 9–48 hours by doses of 100,000–160,000 units needs no comment. Only 5 cases of meningococcal meningitis were treated, with 1 death. The report suggests a scheme of dosage for different infections and different routes, and advises continuance of treatment for a week after temperature is normal. Toxic reactions were rare: there were occasional chills and fever; urticaria occurred in 14 cases, and local thrombophlebitis after intravenous injection in 19 cases. This valuable report will, we hope, soon be followed by a similar record of the collective experience with penicillin among our own Service and civilian sick.

Meanwhile the search goes on for improved methods of production and for alternative bactericidal substances from other moulds or bacteria. CLIFTON,[3] for example, has adapted the principle of the generator process for making vinegar to the production of penicillin on an experimental scale. Active principles have been extracted from aspergillus,[4] from actinomyces[5] and from other moulds.[6] The use of the ester of penicillin[7] may obviate the need for frequent injections, while a possible synergism between penicillin and sulphonamides or even *p*-aminobenzoic acid[8] deserves further exploration. But production of penicillin still lags far behind demand, and despite ministerial reassurance it is difficult to escape an uneasy feeling that not everything possible is being done to expedite supplies.

TEACHING OF PREVENTIVE MEDICINE

THE interim report of the social and preventive medicine committee of the Royal College of Physicians, published this week, is of fundamental importance in the teaching of medicine. Here for the first time in this country are drawn together into a comprehensible pattern those many-coloured threads of sanitary science, public health and social medicine which no one person has hitherto been able to disentangle and weave into a whole.

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[1] *J. Amer. med. Ass.* Aug. 28, 1943, p. 1217.

[2] Fleming, A. *Lancet*, Oct. 9, 1943, p. 434.

[3] Clifton, C. E. *Science*, July 16, 1943, p. 69.

[4] Bush, M. T. and Goth, A. *J. Pharmacol.* 1943, 78, 164.

[5] Gardner, A. D. and Chain, E. *Brit. J. exp. Path.* 1942, 23, 123.

[6] See Atkinson, M. *Med. J. Aust.* 1943, i, 359.

[7] Meyer, K. F., Hobby, G. L. and Dawson, M. H. *Proc. Soc. exp Biol. N.Y.* 1943, 53, 100.

[8] Ungar, J. *Nature, Lond.* Aug. 28 1943, p. 245.

The report deals with the teaching of social and preventive medicine to undergraduates and with the arrangements for that teaching inside the hospital: a sequel will cover its organisation outside. "Social Medicine," according to the committee, "is concerned with the social environment and with heredity in so far as they affect health and well-being. Preventive Medicine is more executive in outlook and comprises the design and direction of measures for the preservation of health and the prevention of disease." These definitions are not entirely satisfactory, since social medicine—though a vast subject in itself—is clearly but one aspect of preventive medicine. To immunise a child against diphtheria is preventive, not social, medicine; to remove bad housing conditions may be both; to pay allowances to persons with tuberculosis to induce earlier treatment is clearly social medicine but equally a part of preventive medicine. This obscurity, however, does not greatly matter, since the report makes no practical distinction between the two and couples them together except in the discussion of the comparatively new specialty of Social Medicine in its strict sense.

As is well known to individual teachers of these subjects, little has been done to put into effect the aspiration of the General Medical Council that the student should have his attention directed to the preventive aspects of disease. Even where progressive schools have tried to attain the object of the GMC by splitting up the course among the usual clinical teachers, little integration has been achieved and what was at least a single subject under the hand of one man has been shared out among persons some of whom are uninterested in these aspects, and consequently there are sometimes wide gaps in the student's knowledge. For this reason, among others, it is recommended that "every medical school should establish a Department of Social and Preventive Medicine, the size and scope of the department depending upon the facilities and personnel available." The organisation of such a department and the qualifications to be required of its head—admittedly a rare combination at present—are discussed in some detail. The report boldly sets out a curriculum in social and preventive medicine, to include the historical approach; the existing health services; epidemiology and vital statistics; maternity and infant welfare; school medical services; tuberculosis and venereal diseases; industrial medicine; health education and rehabilitation. This arrangement agrees with the general lines laid down by FITZGERALD[1] following his world survey in 1936–37. Perhaps the coffin is nailed down a little too closely on "sanitation." "The environmental services *as such* need not detain the student . . . the technical details of ventilation, smoke abatement, water supplies, sewage disposal and other objective health studies are matters for post-graduate instruction for the diploma in public health." True; but every doctor should know something, however little, more than the average layman of such matters as the sources of pollution of a water-supply, the disposal of excreta in a camp or dampness in houses. Much time might be saved in teaching these matters by instructional films, to which the report hardly alludes, were suitable films available.

By far the most interesting part of the curriculum is the new ground broken by the proposed introduction, in the final stage, of instruction in the technique of social investigation and case-taking, linked up with the health centre, the almoner's department and the psychiatric social worker. By these or other methods, this had been achieved abroad before the war—as was shown by GOODMAN[2]—notably in the USA, at Nancy and in Brussels, and although the organisation is difficult, it is certainly possible. All this can, the committee think, be achieved without a great increase in the time allotted to the subject, except in the London schools, whose comparatively poor showing in this respect is well known.

The arrangements for social medicine inside the hospital depend upon the almoner's department, and useful information and advice is given on its organisation and extension, which should finally dispose of the idea that the almoner is a kind of unauthorised tax-gatherer, solely concerned with the collection of money. The teaching of social and preventive medicine to nurses and the use of psychiatric social workers is also discussed and the report ends with seven recommendations, which call for the establishment of a department of social and preventive medicine in every teaching school to organise a modernised course covering the three clinical years, including social medicine in the strict sense and industrial medicine; for the setting up of student health services, used as an instrument of teaching, and under the general direction of the department; for the employment of almoners and psychiatric social workers; and for the Royal College of Physicians to take an active part in the organisation of the teaching of this great subject to students, nurses and medical social workers.

This is the report long awaited by those who have felt that preventive medicine will never achieve its rightful place until a new generation of students, trained in its principles, pass on to provide teachers having the true "preventive outlook." By producing this document, and its companion on the teaching of psychological medicine which we summarise on p. 553, the College has indicated objectives and provided plans of attack. It is for the teaching schools to capture and consolidate the positions.

WAR AND THE DOCTOR

THERE are said to be only seven basic jokes, and sometimes it looks as though the same may be true of ideas. Certainly fundamental principles in medicine and surgery have recurred from time to time to the mind of man, attended by all the thunder of revelation; and advances have commonly been in methods of applying them rather than in the principles themselves. War-time advances in technique are commonly of this kind. Thus PARÉ's belief in the gentle usage of wounds finds beautiful expression in modern plaster technique; and the "flying ambulances" devised for taking the wounded to the rear by Napoleon's surgeon, Larrey, have now achieved a literal interpretation. In the extracts from Prof. HUME's Harveian oration which appear on another page, there are several enlightening examples of this kind. His hearers and his readers will alike be grateful for a review which brings back the past to illuminate the present.

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[1] FitzGerald, J. G. *J. Amer. med. Ass.* 1938, 110, 1321.

[2] Goodman, N. M. and Morris, C. *Proc. R. Soc. Med.* 1940, 33, 15.

Annotations

INFECTION AND FŒTAL MORTALITY

Of late years increasing attention has been paid to neonatal infection. Not long ago in his Ingleby lectures, Prof. Charles McNeil discussed the work in Edinburgh on this subject, and indicated the way in which this cause of death in early life could be attacked mainly by prevention. Work in New York on fœtal mortality takes the prevention of infection a stage further back, so to speak, and is complementary to the studies of McNeil and his co-workers.

Douglas and Stander[1] have devoted their inquiries to infection during long labour. For some years they had been taking blood-cultures from the hearts of stillborn infants immediately after delivery; they were particularly interested in the effects of long labour, and it soon became obvious that most positive blood-cultures were found in infants who had experienced such labour—in which moreover, there was definite clinical evidence from the maternal side of intrapartum infection. In taking the blood-culture from the infant the skin over the precordium is prepared with iodine and alcohol. A sterile needle attached to a 5 c.cm. syringe is then inserted directly into the heart, and the blood or plasma thus obtained is inoculated into different media and incubated under both aerobic and anaerobic conditions. In one group of 85 infants thus investigated there had been no obvious cause of death. A positive blood-culture was obtained in all, and though in 11 of them other possible causes of death were discovered, it was felt that even in these the bacteræmia may have played a part. The organism most commonly found was an anaerobic streptococcus including facultative strains. Investigations of the blood were also made in babies dying after labours in which there was an obvious cause of death such as intracranial hæmorrhage, congenital abnormality or asphyxia. A total of 140 such babies yielded negative blood-cultures.

In the 85 infants with positive blood-cultures, most of whom showed no cause of death apart from the bacteræmia, the fœtal heart stopped before the onset of labour in 16, during delivery in 20, and during labour but before the actual delivery in 47. The usual autopsy findings in this stillbirth bacteræmia group included maceration, petechial hæmorrhages, and in a few there was pneumonia. Examination of the placenta showed inflammation in 44 (out of the 85), and maceration in 10; it was classified as completely normal only in 15. It is suggested that during long labour organisms present in the vagina became invasive and pathogenic, reaching the fœtus eventually through the placenta. Another probable route is by aspiration of infected liquor. Towards the end of the investigation an attempt was made to use the sulphonamide group of drugs to control maternal infection and thus fœtal infection in long labour. Encouraging results were obtained when the drug was given at an early stage before the development of fever and vaginal discharge. It was also found, from an analysis of the results, that operative procedures aimed at speeding up delivery in long labour gave poor results for mother and child. Spontaneous delivery is better.

These findings are of great interest in relation to some of the mysterious cases of stillbirth. Hitherto it has been accepted that infections reaching the infant through the placenta are limited to syphilis and in rare instances tuberculosis. The fact that bacteræmia and on pathological evidence septicæmia in the fœtus may result from intrapartum maternal infection indicates lines on which prophylaxis may develop.

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[1] Douglas, R. G. and Stander, H. J. *Amer. J. Obstet. Gynec.* 1943, 46, 1.

THE CHANCE FOR GENERAL PRACTICE

"Change and decay in all around I see" is the natural response of the pessimist to any modification of his environment. In the presidential address last week to the section of epidemiology and state medicine of the Royal Society of Medicine, Sir Weldon Dalrymple-Champneys, whom none could call a pessimist, implied that change is not irrevocably wedded to decay: sometimes it is a sign of growth—though of course it may be hard for the contemporary observer to guess which he is looking at. He reminded his hearers of the misgivings among doctors in 1911 about the National Health Insurance Act. Yet now, he said, the system is so firmly established in their affections that a large section of the profession seems to think its extension the best way of providing a comprehensive medical service. As a result of the state care of children and expectant and nursing mothers, supervision of the family is split up—unfortunately he feels; and he believes that the ideal is continuous medical supervision of the individual by the same person. The mistrust shown in 1911, and the failure of the family doctor to take a fuller part in the health services provided by the state, he attributes largely to the failure of medical education to keep pace with the swing towards preventive medicine. He neatly compared the airman who spies the enemy afar off, and the radiolocator who spots him long before he comes into sight, with the medical student, his contemporary, growing skilful in the discovery of the first glimmerings of ill health.

In the past medicine has often fallen into decay, the wisdom of a civilisation often being lost for centuries. It is not impossible that this might happen again: it nearly happened in Germany in 1940, said Sir Weldon, under the tyranny of Nazi ideas. Decadence usually coincides with over-specialisation on insufficient knowledge, and the only sure defence against over-specialisation, he holds, is to give the general practitioner a dominant share in the care of the patient, and to fit him for the task. That the general practitioner should "turn a blind eye to the opening stable door, waiting, until the horse is loose to start chasing it" is not only contrary to the traditions of the profession but contrary to common sense. He was not suggesting that the family doctor should be an expert on environmental hygiene, though he should understand its principles; or an epidemiologist, though he should be familiar with the ways in which infectious diseases are transmitted; but he ought to know three things: his patient's heredity and environment including his circumstances at home and at work; his medical history and present condition; and the agents that can be invoked to restore him, whether methods of treatment or organisations. He believes that the general practitioner must be established surely as the guardian of the family, and his hand must be strengthened in every possible way by the weapons of modern science and state organisation: with this support he has a chance of occupying a key position in medicine and the state, to everybody's benefit.

TRYPTIC DIGESTION OF LIVING TISSUES

It has always been a puzzle why the intestine does not digest itself with all the medley of enzymes which it secretes, and the failure of trypsin to attack bacteria is remarkable considering how much more easily it can digest mammalian tissues. For part of the puzzle Dragstedt[1] has now suggested a solution which has attractive points. It seems that one of the actions of trypsin on mammalian tissues is to liberate histamine from them, and it has been found that a subcutaneous injection of trypsin, too weak to bring about local tissue digestion, can be made to do so if histamine is injected at the same time. Dragstedt's view is that trypsin first liberates histamine, and that this in turn so disorganises the local blood-supply that the cells lose their vitality and become digested. Bacteria are avascular and insensitive to histamine, and hence retain their vitality even in the presence of concentrations of trypsin that would be lethal for mammalian tissues.

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[1] Dragstedt, L. R. *Science*, 1943, 98, 131.

As Dragstedt himself is careful to point out, this hypothesis does not explain why healthy living cells are not digested by trypsin, and the resistance of the intestinal mucosa must remain for the present one of the mysteries of physiology; but it does offer an explanation of the relative susceptibility of vascular tissues, and hence eliminates any necessity of postulating that bacterial protoplasm has developed special tryptic resistance.

THE MALTA EPIDEMIC OF POLIOMYELITIS

NOT long ago poliomyelitis was regarded as a droplet infection with the virus passing from the nasal mucosa via the olfactory nerves to the susceptible motor nerve-cells in brain and spinal cord. It was, however, found difficult to reconcile the autumn incidence of poliomyelitis with its being a respiratory infection. At last week's meeting of the neurology section of the Royal Society of Medicine Prof. S. P. Bedson reviewed present opinion about how the disease is conveyed. For many years Kling from epidemiological data, and Toomey from experimental evidence, have been strong advocates of an intestinal mode of spread. The failure of zinc sulphate sprayed into the nose to protect against infection in the Toronto epidemic, and the absence of lesions in the olfactory lobes of fatal cases, were points against the nasal entry of the virus. Recent American work has shown that the virus can be readily recovered from the fæces of clinical and abortive cases, and of intimate contacts, and also from sewage effluents of hospitals where there are infected children. A cynomolgus monkey, infected by spraying the virus into the mouth after the olfactory route was blocked, showed lesions severest in the ganglia of the 9th and 10th nerves whose branches supply the oropharynx. Tonsillectomy in children exposed to infection may be followed by the highly fatal bulbar form of the disease. This, and other evidence, indicate that the principal portals of entry of the virus are the oropharynx and the gastro-intestinal tract, and that the vehicle of spread is probably contaminated food, milk or water. A concomitant droplet spread is not ruled out, but the new knowledge must obviously mean a reorientation in our measures for controlling the infection.

Later in the same discussion Prof. H. J. Seddon described, with many illustrative photographs and charts, an epidemic of poliomyelitis which occurred in Malta between November, 1941, and February, 1942, involving some 400 Maltese children and about 60 British and Dominion troops. In Malta the infection is endemic with only a few notified cases each year. The epidemic wave began at a time of great upheaval and distress in the island, when it was more or less isolated. It broke out first among the native children about [illegible] five years, with the peak in the [illegible] cases under three months of age. Case-fatality among the children was 3·5% and among the affected troops 17%. Only 3 clinical cases were detected among adult Maltese. Of possible predisposing causes neither overcrowding nor malnutrition seemed to play an important part. Instances of case-to-case infection were rare. A possible significant factor was the use of untreated sewage as fertiliser during the autumn of 1941 and Professor Seddon wondered if the epidemic could have been water-borne. The lumbar section of the cord was the most frequently affected. There were 27 cases of abdominal paralysis; cases of facial paralysis were usually associated with paralysis of a limb; and there were some cases of bulbar paralysis. Considerable ingenuity was needed for the preparation of splints and apparatus for remedial exercises. Crippling occurred in a quarter to a third of the cases.

Contributing to the discussion Sir Arthur MacNalty dealt with his own experience of respiratory and intestinal modes of spread; Dr. F. E. Camps gave some details of an outbreak in Essex which was possibly food-borne, and Dr. Agius Ferrante, in describing some of the early clinical features in the Malta outbreak, stressed the importance of periodic flushings of the face, abdominal colic and uneasy micturition. Replying to questions Professor Seddon said that the weather at the time was like our early autumn, that flies were prevalent, that many of the affected breast-fed children were getting supplementary feeds, and that the relief food-supplies did not come until after the epidemic had begun.

BLOOD-PRESSURE AND OLD AGE

WHAT constitutes "high" blood-pressure is a question whose importance increases as the population grows older. Few would now rely on the old dictum that the normal systolic blood-pressure, expressed in mm. Hg, equals 100 plus the patient's age expressed in years. In an investigation of over 10,000 healthy subjects, Robinson and Brucer[1] contend that at any age 120/80 mm. Hg is the upper limit of normality. Analysis of their figures, however, suggests that this is not true for old age. Only 189 of their 7478 men were over 65, and the statistical method used resulted, when aged subjects are taken at random, in the exclusion of over 60% of this group. Fresh light is thrown on the problem by Russek[2] who studied the blood-pressure of 1000 retired seamen between the ages of 60 and 95, residents in a home for aged mariners and nearly all of Scandinavian descent. He found that the average systolic pressure rose from 147 mm. Hg in the 60–64 years age-group (120 cases) to 160 mm. Hg at 85–95 (104 cases); the pulse-pressure rose from 65 to 74 mm. Hg in the same period, whereas the diastolic pressure only rose from 82 to 86. Pressures below 150/95 mm. Hg he classified as "normal"; when [illegible] he called the condition [illegible] association of a systolic [illegible] under 95, he described as systolic hypertension. On this basis he found that the percentage of normals decreased from 67 in the 60–64 age-group to 34 at 85–95; of the entire series 50% were normal. The incidence of systolic hypertension rose progressively with age from 17% to 38%, and accounted for 28% of the total, while the incidence of diastolic hypertension rose from 16% to 28% and accounted for 23%. More than a third of the subjects over the age of 75 had "systolic hypertension" and an analysis of mortality figures showed that their expectation of life was much the same as for "normal" subjects. The prognosis of "diastolic hypertension," on the other hand, was very different.

These findings are comparable with those obtained in two independent inquiries into the blood-pressure of Chelsea pensioners. In 1922 Thompson and Todd,[3] examining 102 pensioners aged 75 to 92, found that in 72 the systolic pressure was less than 170 mm. Hg. [illegible] Twenty years [illegible] 120 pensioners [illegible] blood-pressure varied from 149/80 in the 60–64 age-group to a maximum of 166/87 at 75–79, falling again to 147/79 at 85–92. In other words a rise in the systolic blood-pressure seems to be physiological in old age, but the diastolic pressure rises more slowly and may even fall. Russek[2] found that the diastolic pressure varied little after the age of 65. On Robinson and Brucer's view that 120 mm. Hg is the normal systolic pressure at all ages only 13% of Russek's 1000 sailors would have qualified as normal. On the other hand Russek's finding that the average diastolic pressure for normals and those with systolic hypertension was only 78 mm. Hg supports the suggestion that hitherto the upper limit of normality for diastolic pressure has been set too high.

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[1] Robinson, S. C. and Brucer, M. *Arch. intern. Med.* 1939, 64, 409; see *Lancet*, 1939, ii, 986.

[2] Russek, H. I. *Amer. Heart J.* 1943, 26, 11.

[3] Thompson, R. J. C. and Todd, R. E. *Lancet*, 1922, ii, 503.

[4] Howell, T. H. *Brit. Heart J.* 1942, 4, 143.

ELECTRO-ENCEPHALOGRAPHY IN EPILEPSY

Lennox and his colleagues[1] have published a survey of their electro-encephalographic findings in epilepsy. They deal with records from 1000 adult controls and 1260 epileptics of all ages selected at random from private and clinic patients and comprising, therefore, a rather milder type of the complaint than would be found in institutions. Focal EEG abnormalities are not considered in detail, but focal records are included in the statistics. EEGs are classified as paroxysmal (those showing abrupt and specific alterations of pattern), very slow and very fast, moderately slow and moderately fast, and normal. The determining rates for the slow and fast groups are adjusted for younger patients, and where there is a mixture of slow and fast frequencies the predominant rate is selected for the purpose of classification.

These workers divide the paroxysmal records into three groups: (1) petit mal and petit mal variant, (2) psychomotor and grand mal types, and (3) spikes. Though this nomenclature of EEG records according to clinical type has been criticised[2] they vigorously defend it; they claim that different types of clinical seizure are associated with consistently typical EEGs and that when the same type of paroxysmal pattern is found in inter-fit records it is both logical and convenient to name it by the clinical type with which it is associated, especially as it almost always reproduces the pattern obtained in a seizure in the same patient. Much of the difficulty has arisen over clinical definition. The term "petit mal" they limit to attacks where there is transient loss of consciousness without tonic spasm; if there are convulsive movements these consist of 3 per sec. clonic jerkings of eyelids, head or arms. They say that if petit mal is taken to include any sort of short or mild attack, confusion will result; but if we accept this view, there must surely be many epileptic fits which do not readily fall into any of the authors' three categories. The further claim is made that the three types are marked off not only by clinical manifestations and EEG records, but also by a tendency to appear and disappear at certain ages, a sex-incidence, a differing reaction to drugs and a different relation to biochemical states well exemplified by the effect of over-ventilation, or of blood-sugar alterations, on clinical petit mal and the wave and spike records.

In the summary of results the frequency records (as distinct from the paroxysmal) show in control subjects a simple curve with the node at the 10 per sec. rate, whereas the epileptic curve is binodal, with nodes on the fast and the slow sides. In the paroxysmal records adult epileptics appear 33 times as often as the controls, and in very fast and very slow records 20 times as often. The 3 per sec. wave and spike formation is found in 77% of patients with a history of petit mal, in 6% of epileptics without such a history, in 3·5% of relatives of epileptics, and in only 0·2% of non-epileptic patients and normal controls. Some type of paroxysmal discharge occurs in 51% of epileptic children, 29% of epileptic adults, 6% of relatives of epileptics, 1·2% of patients with organic neuropsychiatric conditions (cerebral trauma, tumour, abscess, vascular disease, syphilis) without fits, 0·5% of patients with functional neuropsychiatric conditions (schizophrenia, mania-depression, migraine), and 0·9% of normal controls. Taking very fast and very slow frequencies, as well as paroxysmal records, as indicative of epilepsy, it is concluded that a routine EEG is of great diagnostic value in about half the patients with a history of seizure.

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1. Gibbs, F. A., Gibbs, E. L. and Lennox, W. G. *Arch. Neurol. Psychiat.* 1943, 50, 111.
2. Finley, K. H. and Dynes, J. B. *Brain*, 1942, 65, 256; Jasper, H. in Penfield and Erickson's Epilepsy and Cerebral Localisation, 1941, p. 415.

LIVE VERSUS KILLED TYPHUS VACCINES

THE relative merits and demerits of typhus vaccines made from live and killed rickettsiæ have been much discussed of late. A comprehensive account of them was recently given by Biraud, of the Epidemiological Intelligence Service at Geneva[1]; but Dyer,[2] one of the foremost typhus experts in America, has been quick to take Biraud to task for championing the use of live-virus typhus vaccines. Another contribution now comes from Clavero and Gallardo, of the Instituto Nacional de Sanidad, Madrid.[3] These workers found that one of the rickettsia strains isolated during the 1941 epidemic of louse-borne typhus in Madrid, and maintained by passage in the developing chick embryo, had lost its virulence for laboratory animals but retained its immunising power. These findings were obtained in experiments on guineapigs and monkeys (*Macacus sylvanus*) and in the latter species use was also made of the Weil-Felix and the Giroud tests as criteria of induced immunity. Though the number of animals in the experiments was not great, the authors felt that their results justified a preliminary report.

It will be remembered that live-virus vaccines have been employed on a large scal by French workers in North Africa, but not elsewhere. These vaccines were made from rickettsiæ of flea-borne or murine typhus, which is much less severe than the epidemic or louse-borne variety. Nevertheless there have been serious mishaps when the vaccines were given to subjects who were more susceptible to typhus than is the indigenous population of North Africa. The live-virus vaccines of Blanc (biliated flea-virus) and of Laigret-Durand (mouse-brain) contain rickettsiæ which are not attenuated and may produce vaccinal murine typhus if the dosage is slightly too strong, or fail to give protection if the dose is slightly too small. The attenuated strain of the far more dangerous louse-borne virus, which Clavero and Gallardo now propose using instead of the murine virus, is not likely to commend itself to opponents of the employment of a living typhus vaccine. Some years ago Cox[4] observed that rickettsiæ from yolk-sac culture may lose their virulence and retain their immunising power, but this discovery did not lead to the introduction of such cultures as live-virus typhus vaccines.

Sir ERNEST GRAHAM-LITTLE has been elected chairman of the Parliamentary Medical Committee in place of the late Sir Francis Fremantle.

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1. Biraud, Y. *Bull. Hlth Org.* LoN, 1943, 10, 1.
2. Dyer, R. E. *J. Amer. med. Ass.* 1943, 122, 828.
3. Clavero, G. and Gallardo, F. P. *Revista de Sanidad e Higiene Pública* (Madrid), June, 1943.
4. Cox, H. R. *Science*, 1941, 94, 399.

TEMPORARY TONIC MOTOR PARALYSIS.—Major G. DE M. RUDOLF informs us that a paper with this title, dealing with a condition which he believes has not hitherto been described, has been deposited in the library of the Royal Society of Medicine, Wimpole Street, London, W.1. This paper may be consulted by any who are interested, but "as the condition is probably of a psychological nature, it is considered unwise in the national interests to publish a description of it until after the close of hostilities."

Special Articles

PHYSICAL MEDICINE: ITS SCOPE AND DUTIES

LORD HORDER'S SURVEY[1]

THE formation of the British Association of Physical Medicine comes at an appropriate time. We are about to face, in grim earnest, the problems that have to do with reconditioning and refitting physically, mentally and spiritually, the men, women and children of the nation, injured in all these aspects by a life and death struggle against a sporadic outburst of barbarism. In the general scheme by which this task may be accomplished medicine has a very great part to play and a great deal of its contribution will inevitably lie along the road of physical medicine.

A description of physical medicine recently propounded by Brigadier Howitt makes an appeal to me. He gives it three functions: (1) the achievement and maintenance of physical fitness; (2) the diagnosis and treatment, preventive and curative, by physical means, of disease and disability of the locomotor system; and (3) the physical selection, training and reinstatement of personnel in industry and in the Armed Forces.

The aims of our association closely correspond with these functions, for the first of them is "to encourage the study of the action of physical agents and their application in the promotion of health; in the prevention and treatment of illness and injury; and in the restoration to fitness."

FITNESS

If this be accepted as our brief, to what cases does it apply? It applies to keeping the fit, fit, which is only another way of stating the case of "positive health" of which, these days, we hear so much. It also applies to making the near-to-fit, quite fit. Both these activities are aspects of preventive medicine, to which the modern reorientation of medicine has been directed. The days of great epidemics which mowed down the people in swathes have disappeared, and there is time for medic[illegible]o the individual citizen—time [illegible] Spencer had in his mind when [illegible]ce of good animals is the first [illegible]prosperity." The tempo of our efforts at achieving national fitness, bodily and mentally, has just at present been speeded up. Never was the individual citizen so marked down for hygienic attention as now. But when the stimulus of the war is over, what is to be the incentive to fitness then?

There is no doubt that we have let our bodies go; our [illegible] And our heads [illegible] here were quite [illegible]r and sleeplessness and odd tricks played by their nerves. So let us give the body a chance for a bit, and don't let us think we are wasting time in doing so. In this field physical medicine must play an important part—indeed the most important part. It must lead and guide and control.

APPARATUS, EDUCATION AND RESEARCH

The association's brief also includes control of the whole range of those physical measures of diagnosis, prognosis and treatment which go conveniently by the name of physiotherapy. Into this group come skilled manipulation, [illegible] balneology and [illegible] tion of light a[illegible] kinds of ray t[illegible] connexion with this object of the association that the further aim "to evaluate apparatus and methods claimed to be useful in physical medicine" will prove of help, both to our profession and to the public.

The test of all claims to add to the armamentarium of the doctor is the ability of their exponents to state pathology clearly and to demonstrate that the method or apparatus follows recognised principles of science in its construction and its action. The public have great faith in apparatus; they think an instrument cannot lie. We have to save them from themselves. We must resist the temptation to play up to their demand for the machine or to give them the physiotherapist equivalent of the bedside manner.

And here we must consider the spas and health resorts of this country. Their status, and the position which they have so far taken in physical medicine, are notoriously unsatisfactory. Dr. C. W. Buckley has just compared the use made of spas by our Soviet Allies with ours at home—much to our discredit. He thinks that we must be much more democratic in our outlook upon spa possibiliti[illegible] for education of the state, [illegible] the spa, education of other [illegible] perhaps finally education o[illegible] uses and value of spas. Here indeed is pertinent work for this association.

Our brief covers efforts at correcting deformities, both congenital and acquired; the overlap between this association and the work of our orthopædic colleagues is therefore considerable and we shall look to them for strong support. We also cover much that is known, and perhaps still more that is unknown, in the ætiology and treatment of the chronic rheumatic diseases, in which we have close affinity with the Empire Rheumatism Council.

In some fields of medicine we have gone ahead with treatments in the absence of exact knowledge of the causative factors (as in cancer) or lacking specific therapy, though the causative factor is known (as in tuberculosis). In cancer a form of physical treatment (radium and X-ray therapy) has brought us relatively good results. In tuberculosis a series of physical methods have changed for the better the outlook for the chronic case. Let us bear these things in mind when we remember that some of the ætiological factors, whether microbic or metabolic or neurogenic, are still obscure in relation to many cases of rheumatic disease.

There is scope and need for research in methods of physical treatment, and this issue is closely bound up with education. Our constitution stresses the importance of undergraduate and postgraduate training in the principles and practice of physical medicine, and exists to encourage both of these. We hold a brief for improving the status of the physical medicine specialist and for securing a diploma in physical medicine. The endowment of one or more university chairs would help us further towards attaining our aims than anything else.

Finally, to educate the community in the value of [illegible] but we must not hesitate [illegible] close coöperation with the [illegible]chools and with industry.

THE OPENING PROSPECT

We have outline[illegible] to be considered. [illegible] of great changes i[illegible] necessitates cautio[illegible] born.

Nearly t[illegible] at the Lee[illegible] as my the[illegible] Wherever, [illegible] valid and [illegible] particular [illegible] have done [illegible] causes on [illegible] but now, as the result of your loyal and effective help, and your determination to sink individual views and preferences in the common interest, there has been formed the British Association of Physical Medicine. Its future lies with you.

PROPHYLACTIC SULPHONAMIDES IN JUVENILE RHEUMATISM.—In view of favourable American reports, the education committee of the London County Council have arranged that prophylactic treatment with sulphonamide shall be given to 100 selected rheumatic children attending supervisory centres. These centres are staffed by physicians experienced in rheumatic disease in children and the results will be controlled. None of the children chosen will be receiving treatment elsewhere, and the consent of the parents will be obtained. Blood examinations will be made regularly so that any case of granulopenia will be discovered early.

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1. Extracts from Lord Horder's presidential address at the inaugural meeting of the British Association of Physical Medicine held in London on Oct. 20.

WOUND HEALING

THE CAMBRIDGE CONFERENCE

THE 55th conference of the Society for Experimental Biology, held from Sept. 22 to 24, took the form of a symposium on wound healing. No meeting of similar size with this as its subject had been held in England since that convened by the Medical Research Council in November, 1940; and comparison of the two demonstrates steady, if nowhere spectacular, advance in understanding of the biological principles of wound healing and how they may best be put into practice. Two contributions in particular—the local application of sulphonamide powders for controlling wound sepsis, and the use of penicillin—which were reported at the earlier meeting in the laboratory stage of investigation, have now been widely received into clinical practice. Mr. E. CHAIN, PHD (Oxford) and Dr. MARY FLOREY (Oxford) reviewed the chemistry and the present clinical standing of penicillin; and their evidence showed that in all respects, except large-scale manufacture, penicillin has fulfilled its earlier promise. Dr. F. HAWKING (London) gave a practical-minded review of the behaviour of sulphonamides in infected wounds and the means by which their effects could most economically be secured.

The importance of vitamin therapy in the systemic treatment of wounds was recognised before the present war; but, as Mr. L. J. HARRIS, DSC (Cambridge) pointed out, only vitamins C and D were known to have a special significance for wound healing. Even so, no special nutritional principles are thought to be involved: the action of vitamin D in securing calcification, and of vitamin C in promoting the activity of all classes of formative cells, is essentially the same in wound repair as in physiological development. Mr. P. D. F. MURRAY and Dr. E. KODICEK (Cambridge) and Mr. G. H. BOURNE, DSC (Oxford) described their histological observations on the effects of graded vitamin-C deficiency on the maintenance and healing of bones and soft tissues in the guineapig. Their work served to emphasise the reality of subclinical deficiencies: there was every reason to suppose that lack of vitamin C had a significantly harmful effect in man on dietetic levels at which the clinical signs of scurvy do not appear.

The subject of general metabolism during wound repair was adequately, but—in view of the biological nature of the conference—not exhaustively discussed. Dr. D. P. CUTHBERTSON (Glasgow) and Dr. R. J. ROSSITER and Mr. E. J. CLARK (Oxford) described clinical and laboratory investigations on protein metabolism during wound healing, particularly after burning; and these were supplemented by a description of histological changes in burned skin by Mr. E. H. LEACH (Oxford). It was not certain, Dr. CUTHBERTSON said, whether the loss of N, S, K, and P in the "flow" phase of metabolism after burns and other injuries is due to depressed general anabolism or to an increased protein katabolism: high-protein diets did not make good the loss; nor apparently did preliminary periods of protein inanition accelerate it. But it was a reasonable inference that in any condition involving debility through tissue loss the patient's diet should contain gradually increasing quantities of protein—particularly animal protein, for its high content of cystine and methionine.

At the outset of the meeting, Mr. E. N. WILLMER (Cambridge) had insisted that wound healing was fundamentally a cellular process. It depended on a delicate equilibrium of cellular activities which varied with the size and nature of the lesion, and which—in attempts rashly to stimulate one or to suppress another—we might easily upset. He agreed with Prof. PATERSON ROSS, FRCS (London), who defined the clinical fundamentals of wound treatment, that the natural process of repair required not acceleration but only an opportunity to exert itself in the most effective way.

Contributions on the cellular aspect of wound healing naturally took the lion's share of the contributions; and it would have been wrong to expect each one to lead directly to clinical innovations. Miss HONOR FELL, DSC, and Mr. J. F. DANIELLI, DSC (Cambridge) led the way to an understanding of the biochemical background of at least one formative process in wound repair, by producing evidence of the circumstantial relationship een the presence of alkaline phosphatase and the formation of collagen fibres. Mr. M. ABERCROMBIE, D PHIL (Birmingham) described the relationship between cell movement and cell proliferation in the union of severed nerves—a study of particular importance for biologists, who have long recognised the significance of this cellular relationship in the earliest stages of development. Mr. J. Z. YOUNG (Oxford) translated the observed behaviour of axon protoplasm in the central and peripheral stumps of divided nerves into terms of colloid chemistry, and showed how the nucleus of the neuron might maintain the integrity of the axoplasm by keeping its long fibre-like molecules in their correct morpho logical alignment. Mr. A. H. S. HOLBOURN (Oxford), i a similar way, sought the cause of the distribution o brain lesions in the mechanics of shear stresses (see *Lance* Oct. 9, p. 438). Experimentally, and in clinical practic lesions occurred in those regions of the brain wher unilateral tensions and compressions exceeded a certai critical value. Dr. DOROTHY RUSSELL (Oxford) sai that although healing processes in brain wounds ar fundamentally similar to those following injuries to othe tissues, the extent of the initial necrosis and ultimat scar-formation are relatively greater; and because of th superficial position and vulnerability of the vessels supply ing the cerebral convexities, only those chemotherapeuti agents should be used which had a minimal damagin effect on tissue—notably penicillin solutions.

A contribution from Lieut. J. M. BARNES (Oxford) o vascular changes after injury bridged the gap betwee the cellular and the systemic line of approach. H described the significance of reflex arterial spasm afte injury, and particularly emphasised the importance o interfering with the delicate and unstable wound circulation as little as possible.

Plastic surgery is that department of medicine in which the clinician has always been ahead of the laboratory worker; not only in recognising the biologica principles of wound repair, but also in putting them effectively to work. Mr. RAINSFORD MOWLEM, FRCS (London) impressed the conference by showing that bone-grafts consisting of loosely packed chips of cancellous bone will heal promptly, soundly, and in the correct morphological relations, and maintain the highest resistance to infection. He contrasted their behaviour with that o massive saw-cut grafts of compact bone, which were commonly used on the faulty assumption that bone, like tendon or fascia, is an inert tissue. The concept o cellular survival should regulate the plastic repair o bone. Dr. H. T. BARRON (London), reviewing his experience of 800 cases of plastic repair by skin autografts, described the principal variables of graft healing and the probable biological explanation of each. Dr. A. GLUCKSMANN (Cambridge) had examined the histogenesis of scar keloids in 70 of Mr. Mowlem's and D Barron's cases. He had found evidence that keloids were essentially fibrosing granulomata, not true fibromata; and that they started from an originally localised —though ultimately diffuse—reaction towards extrinsic or intrinsic foreign bodies in sensitive patients. In experimental and clinical studies with Dr. T. GIBSON (Glasgow), Mr. PETER MEDAWAR (Oxford) had found striking circumstantial evidence for the astonishingly neglected theory that skin homografts fail in man, and in other mammals, because they generate an active immunity in their recipients. There could be no question of using skin homografts in clinical practice, other than as wound dressings, until—if it were ever possible—the genetic background of tissue compatibility had been worked out.

The conference might well have concluded by further reflection on the lines upon which Prof. H. A. HARRIS, MD (Cambridge) opened it. The problems that John Hunter described on his return from the Peninsula were much the same, he said, as those we face today; and in the 14th century John Aderne formulated principles of wound treatment to which we have little to add. There was a continuity, in medical history, of the central problems of scientific treatment; periodic wars gave them peculiar urgency, but not novelty. Humility, born of this sense of history, may not be a powerful stimulus to the prosecution of scientific work; but it should govern its appraisal. At all events, it could in this case be qualified by a reasonable satisfaction at some definite scientific achievements.

TEACHING OF PSYCHIATRY

THE approach to the psychological and social aspects of disease has changed profoundly in the last twenty years; and the change is reflected in the two interim reports just presented to the Royal College of Physicians by their committees on psychological, and on social and preventive, medicine. The implications of the latter report are discussed in our leader (p. 516); the psychological report, which is complementary to it, recognises that psychiatry has grown beyond the stage at which the student's needs could be served by a dozen lecture-demonstrations at a mental hospital: his training in it must now rank among the most important parts of the curriculum.

The report [illegible] ng school should [illegible] patients and in- [illegible] "as a minimum, a psychiatrist, a psychiatric registrar, a resident, a number of clinical assistants, a psychologist trained in intelligence testing, psychiatric social workers and secretarial assistants." Psychiatry would thus be represented by a complete unit. The committee, moreover, look forward to the day when there will be a professorial chair of psychiatry in every medical school. The [illegible] vent [illegible] depe [illegible] departments of the hospital.

The student, they consider, should take a course in normal psychology [illegible] in the wards. Throughout the clinical period he should take a systematic course in psychiatry. The syllabus cannot be rigidly laid down since it must be flexible enough to suit different hospitals, but they feel that the course [illegible] by sem [illegible] range [illegible] course would include meetings in the outpatient departments and wards of the hospital, at local psychiatric centres or admission wards in mental hospitals, and visits to mental deficiency institutions, child guidance clinics and pædiatric outpatient departments. The student should spend three months as a clerk in his own hospital psychiatric department during his first or second clinical [illegible] ork in one of the other [illegible] the department of [illegible] and make case notes on at least 6 psychotic and 20 neurotic patients.

A suggested systematic course covers principles of diagnosis, general causes and pathology of mental illness, principles of prevention and treatment (physical, psychological, and social), toxic and organic syndromes, affective syndromes, schizophrenia, psychopathic personality, hysteria, obsessional syndrome, other psychological aspects of physical disease, children, mental deficiency and forensic psychiatry. It is suggested that during the last clinical year a short resident period in a mental hospital or a clinical clerkship in an observation ward might form part of training, coupled with domiciliary visits in the company of a psychiatric social worker. The committee attach much importance to the teaching of mental deficiency and advise that six of the lecture demonstrations in the systematic course should be on this aspect of psychiatry and that at least two of them should be conducted at an institution for mental defectives.

Finally the committee propose that the student's knowledge of normal psychiatry should be tested by examination at the end of the preclinical period, and that in the finals there should be a separate examination in psychiatry, to be taken either at the end of the clinical period or earlier.

BRITISH PÆDIATRIC ASSOCIATION.—The September issue of the *Archives of Disease in Childhood* contains two reports by this association, one on the early diagnosis of tuberculosis in childhood, and the other on *arrangements for newly born babies in maternity hospitals*. Copies of these reports may be obtained from the acting honorary secretary, Dr. Donald Paterson, 27, Devonshire Place, London, W.1.

In England Now

A Running Commentary by Peripatetic Correspondents

SOME of your correspondents seem to me ignorant of the facts of life, as applied to their profession. There was the one who maintained that we are "probably the best educated, most intelligent, most altruistic and most worldly-wise group in England today." No Sir. I am afraid we are neither well educated nor particularly intelligent. The old tradition still holds good that if parents are in doubt how to dispose of their more stupid offspring, the only profession in which they can be assured of a guaranteed job is medicine. Any experienced teacher will agree with me that the student who cannot pass a [illegible] mentally deficient [illegible] who have outstand [illegible] obvious exceptions [illegible] such as physiology [illegible] ally there is no [illegible] in the prac [illegible] satisfaction, [illegible] but the docto [illegible] and log [illegible] Then, t [illegible] means the end of all p [illegible] hile the present system [illegible] te freedom, has no relat [illegible] oes the average GP or consultant possess? What consultant dare refuse a call, even at the most inconvenient moment? What GP dare ignore a summons from a patient? No, the present archaic system is the acme of slavery and serfdom. Either from financial reasons or simply in order to build up a reasonable practice the practising doctor of today has no semblance of liberty of action.

* * *

If it must be Sicily or North Africa give me Sicily every time. Nobody seemed to be taking much notice of us as we tripped up the beach from our invading craft. That nonchalant air which characterises the British soldier as he steps out on a foreign strand, and which you have doubtless noticed in the news reels, is quite genuine. It seems the most natural thing in the world to Tommy Atkins that he should trail away into Sicilian orange groves and "brew up" as though he were on Salisbury Plain. I don't know whether it was the custom in the last war, but when a meal or a hot drink is ready for serving, the cookhouse staff set up the cry, "Tea up"; or in the case of a set meal, "Come and get it." and the invitation is accepted with alacrity by all. But if we were casual in our demeanour as invaders, the conquered people were even more so. True there were no "tears of joy," but there was not the slightest sign of resentment; and many of the peasants gave us a smile and the V sign with their fingers as they passed by on their carts and buggies. The [illegible] gang of thugs was a matter of [illegible] and many anti-fascists had [illegible] to deface the silhouette of [illegible] on nearly every white wall i [illegible] through. Sicily, at all events, seems to have had a raw deal from the fascist administration. The villages, picturesque and bizarre when seen in the distance, are tawdry and squalid on closer inspection. Sanitation is primitive in the extreme, and the dwellings emit a disgusting smell which drifts well beyond the boundaries of the place. On the other hand, the picture postcards are exceedingly att [illegible] inhabitants are fortified by [illegible] Mussolini's speeches plast [illegible] y every room of the schools and other public buildings. Exhortations to work, to multiply, to suffer, and if necessary *to fight and conquer*, have *evidently served as political* blood-transfusions for a poverty-stricken population for nearly two decades.

Having reached the new location in which the Unit is to function, one settles down to the job of helping to make the [illegible] from the f [illegible] *descends* [illegible] of working, eating and sleeping is re-established. Etna and its wisp of volcanic smoke fade into the background; the horizon is limited by a broken ring of "GS [illegible]"

—as the ward tents are officially described—and the inexorable routine of disposing of the sick and wounded occupies nearly all of one's waking hours. The reception tents are never empty. One MO cannot keep pace with the new arrivals. Constantly stooping over stretchers, which move along from the MO's section to the clerks' department like motor-cars on a moving belt, one writes the gist of the story and findings on the "3118" in staccato English reminiscent of Tidy's *Synopsis* or Hey Groves. What a vast amount of repetitive work! "Right thigh, middle anterolateral aspect, T and T wound, MG bullet. General condition good. Ward S1. Morphine gr. ¼. Evacuate." And *after* the battle, the usual pattern is: "Headache, loss of appetite, vomiting, shivering, sweating, 2 days' duration. Spleen palpable. For blood-film. Start quinine gr. 10 thrice daily. Fluids freely. M1 Ward." In medical units no less than in the combatant, war is characterised by long periods of inactivity and boredom, and short bursts of feverish work. Unfortunately during these active periods, when interest in medicine revives, the volume of the work makes it essential to concentrate on disposal of cases rather than a detailed study of their medical aspects. It is imperative to perfect the art of spotting the really ill man—the candidate for resuscitation and the probable "MT" who will slip through your fingers unless he gets his quinine intravenously within the hour. Perhaps one tends to underestimate the value of this kind of work. One is inclined to grumble about the contrast between clinical practice in the field and at the base, and one sometimes becomes quite cynical about the high-falutin ideas on what *ought* to be done expressed by old gentlemen in sumptuous general hospitals at home. But in more sober moments one is obliged to admit that under battle conditions the doctors put up a pretty good show: expedience always looms large, but it doesn't eliminate scientific medicine completely.

* * *

"We were recently accused of being pre-1914 in our outlook. However that may be, we still contend that the prime work for women, in that it is only they who are capable of carrying it out, is the begetting (*sic*) of children and the running of the home. We would go even further and add that for the majority of women this is a whole-time job and one *which should be recognised as such by the State.* Under modern conditions, in this country at least, all women unfortunately are not able to subserve this function and for such we would suggest that there are at least two forms of work which they can do better than men—nursing and teaching of the young. So far as the former is concerned, it seems to be overlooked that no man can make an efficient nurse, whereas, to put it no higher, the average male doctor is just as good as, if not better than, the average female doctor."

—Editorial *St. Thomas's Hospital Gazette*, October, 1943.

My dark unconscious writhes and squirms
    To think how woman cheats me.
We must not meet on equal terms
As complementary fellow worms
    In case the jade defeats me.

When nature gave this rival twist
    To bearer and begetter
She hid it in a jealous mist.
I *must* insist, I must *insist*
    That I am far the better.

* * *

I am just returning to life after a go of tonsillitis—about as obviously organic a complaint as you could find—yet no less than three of my ci-devant friends (now struck off) have already brought up the old couvade "joke" against me. I don't know whether there is any truth in the couvade notion, and don't care, but it has got so widely held that an expectant father can't get a blessed thing these days, from ingrowing toenail to cerebral tumour, without being labelled a neurotic dirty dog. Why, a chap I know had the most terrible toothache during one of his wife's pregnancies, and even when the dentist opened a bag of pus bigger than the tooth he was still treated as a pariah.

The Minister of Health has appointed Major William Woolley, MP, to be his parliamentary private secretary, in succession to Colonel Frank Medlicott, who has taken up a military appointment.

Parliament

FROM THE PRESS GALLERY

Pension of RAMC Officer's Widow

On the motion for the adjournment Mr. Quintin Hogg raised the pension awarded to the widow of Mr. William Bremner Highet, a surgeon of Wingfield Hospital, Oxford, who since the beginning of this war had acquired experience in dealing with soldiers suffering from nerve injuries. In 1942 he was asked to form a new centre in South Africa for soldiers injured in the Middle East. The post carried with it the rank of major. From the outset, said his colleague in the hospital at Oxford, it was agreed that Mr. Highet should go with the rank of major. But to his dismay he was commissioned as a lieutenant. His medical colleague took up the case immediately with the Central Medical War Committee and with certain Army consultants, Brigadiers Bristow, Cairns and Riddoch. An assurance was given that Mr. Highet's promotion was only a matter of days, and that he would not hold merely the temporary rank of major. Major-General Monro, consulting surgeon to the Army, sent the following letter to Mr. Highet's colleague:

> "I passed the letter to AMD 1 with the following comment: 'Highet most certainly would have been classed as a specialist surgeon (neuro-surgeon) and this, I maintain, should have been done before he embarked for S.A. to take up an important post.'"

Mr. Hogg also quoted from a copy of the War Office minute sent by D. P. Stevenson, DADG, from AMD 1, which said: "It is unfortunate that promises were made in writing to this effect"—namely, that Mr. Highet should have a major's appointment—"by Brigadiers Rowley Bristow and Riddoch." The minute went on to show that Mr. Highet was given the rank of lieutenant only because of the technical regulations then in force. The ship in which Mr. Highet was travelling to South Africa was torpedoed and he was drowned. Now his widow was awarded only a lieutenant's pension. The Secretary of State for War, with whom he Mr. Hogg had raised this matter, had admitted that if it was considered that the case justified exceptional treatment it would be possible under the Dispensing Warrant to grant the rank of major from a date prior to that on which the vacancy was filled. The Minister, however, added in his letter that he could not see that there was any question of breach of faith in Mr. Highet's case. Mr. Hogg claimed that an injustice had been done. Any decent employer would have done exactly what he was asking. The word of a subordinate would have been kept. Nobody but the Crown would treat an employee in this way. He doubted whether they were dealing with men so much as bureaucrats, born in a pigeon-hole, swaddled in red-tape, educated at the Treasury, and reaching manhood as a civilian in the War Office. When at last they were removed to another place no doubt there would be written on the tombstone a Treasury minute instead of an epitaph, "Passed to you for further consideration and comment." If this was the way that the Crown treated servants and Sir James Grigg administered his office the sooner he moved from his position the better.

Mr. Arthur Henderson, Financial Secretary to the War Office, in reply said that he agreed that Mr. Highet was an orthopædic surgeon of great ability who volunteered for service in a special, indeed an important, appointment in South Africa at the request of the War Office. He also agreed that the appointment as such carried with it the rank of major. Mr. Highet had had considerable experience in dealing with nerve injuries and there was no doubt that his services would have been of the greatest value. Mr. Henderson quoted from official correspondence to show that it was made clear to Professor Seddon, Mr. Highet's medical colleague, that on assuming the overseas appointment Mr. Highet would be raised to full specialist status, which carried with it the rank of major. Mr. Henderson had not been able to ascertain whether the contents of this letter were conveyed to Mr. Highet, but he thought they were. He claimed that unless and until Mr. Highet assumed the duties of his post he was not entitled to the acting rank of major. He was quite ready to accept Mr. Hogg's tatement that promises were made by certain officer ut they were not carried out before Mr Highet left or his destination abroad Sir ALFRED BEIT and Sir PETER BENNETT supported the plea put forward by Ir Hogg In reply Mr HENDERSON said he was some hat loth to respond to Mr Hogg because he thought e had made a vicious attack on Sir James Grigg None he less in view of the strong representations that had een made he would certainly undertake to convey to he Secretary of State the feeling of the House that this ase should be given special consideration

QUESTION TIME

Disease and Famine in India

Mr R W SORENSEN asked the Secretary of State for India hat information he had respecting the cholera in Malabar nd in other parts of India whether there was a shortage of rugs and medical supplies for civilian use in India, and hat information he had received from the Central Govern nent respecting the spread of disease assistance needed in ombating this and the approximate deaths to date due to amine —Mr L C AMERY replied • There have been reports f cholera in various parts of India I have not so far had ny indication of any widespread outbreak or of any special ifficulty experienced by the provincial governments con erned in dealing with the outbreaks of this or any other isease I have not had recently any report of shortage of rugs or medical supplies for civilian use nor any special eport from the central government respecting the spreading f disease nor any request from them for assistance in this onnexion As regards deaths due to famine the government f India report that figures are as yet incomplete and un eliable, especially in respect of the districts, and I am afraid t must be some time before the loss of life can be even pproximately stated It may afford some guide that in alcutta mortality is reported as about twice the normal for he time of year and that between mid August and mid ctober about 2000 persons suffering from malnutrition have ied in Calcutta hospitals

Diet of British Prisoners in Far East

The Secretary of State for War, in reply to a question, tated that the reports received from the Protecting Power and he International Red Cross Committee regarding conditions n camps in Japan, Korea, Shanghai and Hong Kong indi [illegible] were probably receiving a ration [illegible] to the Japanese depôt troops, [illegible] lished rice with a little flour, egetables, fish and sometimes a little meat, fruit was ometimes available in Japan and rations in Shanghai had ften been supplemented from local supplies by the efforts of ocal friends or the International Red Cross Committee elegate But the evidence left no room for doubt that these ations were inadequate to maintain our prisoners over a long eriod in reasonable health and the Japanese Government ad been pressed to remedy its deficiencies in energy value, nimal protein, fat calcium and vitamins In particular hey had been asked to supplement the diet with soya beans which contain practically all the deficient properties) but hey had refused owing to alleged lack of supplies They ad also been urged to issue unpolished rice instead of polished ice, but they claimed that the bulk of the available rice was lready polished, some rice bran had however, been issued

Medical Man Power

Mr HENRY WHITE asked the Minister of Health if he would ive consideration to the position of industrial areas where [illegible] nd the many long periods of waiting endured by the patients nd would he take steps to put into operation some system of ransfer that would relieve the pressure and secure a more quitable method of medical attention —Mr L BROWN eplied The Central Medical War Committee and its local ommittees in selecting doctors to make up the quota required y the Forces, do their best to maintain an adequate medical ervice for the civilian population but I am afraid that in some reas there must inevitably be a heavy burden on the remain ng doctors and some inconvenience for the public For the reas most in need of help, arrangements are being made hrough the CMWC in accordance with a recommendation of the Shakespeare Committee for the employment of suitabl doctors as assistants in general practice These will be selected mainly from those found unfit for service in the Forces and the powers of direction under the Defence Regula tions will be used so far as appropriate for this purpose

Psychological Examination of Young Women

Mr RHYS DAVIES asked the Minister of Labour whether he had considered the representations from the council of the Magistrates' Association stating that they were alarmed at the number of young women sent to prison for failing to comply with his directions and urging that such women should be psychologically examined before they were prosecuted —Mr BEVIN replied The present arrangements provide for such an examination to be undertaken where this seems desirable and I am exploring the possibility of improving the present methods of identifying appropriate cases for special examination

Rehabilitation of Prostitutes

Mr H LINSTEAD asked the Minister whether, as the fact that his department had found in practice that it was useless to direct prostitutes into National Service indicated the need for a comprehensive inquiry to devise constructive measures to deal with the treatment and training of the social and industrial misfit, he would now set up such an inquiry —Mr BEVIN replied I do not think that the difficulties of dealing with the class of person under the National Service scheme are a sufficient reason why I should undertake the suggested inquiry which would raise many social and medical issues extending far beyond the sphere of my department

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Letters to the Editor

CONTRACTING OUT

SIR,—Mr Lucas Young, in your issue of Oct 16 analyses the problem clearly enough up to a point, All the difficulties he pictures would undoubtedly arise But he seems rather to imply that merely to forbid contracting out would prevent or solve them He writes as if there were something obscure or unreal about that "little something" for which some citizens would wish to step outside the free and equal for-all comprehensive medical service

There is no mystery The citizen would wish first to secure for himself half an hour of his doctor's time—'When can you give me half an hour, doctor? I have something I want to discuss with you' "The clinic is all right," said a young mother who came to discuss weaning problems, "but they only give you two minutes Yes, literally!"

Second, he would wish to consult a doctor who was not the whole time paid servant of anyone, and who owed no allegiance to any corporate body, a man responsible solely to him and to his own conscience and free to speak his mind "They tell me at the hospital " or The school doctor says . "—' so I have come to you to ask your opinion'

Third, he would wish, sometimes, to consult his doctor [illegible] the house by illness

None of these, be it noted, is a frivolous extravagance or a foible of the rich They are all reasonable things to wish for, all have their place in good practice all are [illegible] y day as a matter of course [illegible] doctors by thousands of [illegible] ndly for them according to [illegible] ifficult, some impossible, to obtain from a whole time salaried service, especially from one based on clinics Can anyone believe that citizens would not continue to desire these small but sometimes precious privileg [illegible] will do if the service cannot [illegible] contract out? They will [illegible] tered or not, outside the service, who seems all [illegible] supply what they miss

The truth is, of course that although [illegible] organisation and high taxes the state could [illegible] efficient medical service for every citizen, it can never, by any expenditure or effort of organisation, provide for every citizen the best that private practice has to give; and if everyone must have the same the best must go. The state could provide for every citizen three good meals a day and ensure that nothing worse than second-best beef was ever served. It could never provide for every citizen a meal that a chef would call a first-class supper, and if all must sup alike then a first-class supper must be permanently denied to every citizen. Can we not have the courage to recognise that "the best for everyone" is an idle dream?

I agree with Mr. Lucas Young that the notion of contracting out is an unworkable compromise; but believing as I do that the best should not be sacrificed to the average, and that freedom is worth its heavy price, I hope the citizen who prefers a free man for his doctor will never be made to wish he *could* contract out.

Hampstead, N.W.3. LINDSEY W. BATTEN.

SIR,—The obvious conclusion to be drawn from the first half of Mr. Lucas Young's interesting letter is that those who are not covered by a "state" scheme should join a contributory scheme which would give the full advantages of private practice without the fear of unknown medical expenses. His analogy of medicine with education breaks down on this point, because when a boy is sent to a public school one knows almost exactly what the expense will be, and this is impossible in the case of sickness unless one is covered by some insurance scheme.

If, as suggested in my letter of Sept. 18, the Government subscribed to such insurance schemes for all those who joined, which is democratically just, then much of the argument of the latter part of his letter would lose its weight, as the Government would be making provision even for those in the voluntary scheme, and no-one can imagine that prices and salaries are going to remain static for the next twenty years, so there is always the possibility of revision.

The real question is whether it is good for private practice to continue, and this cannot be supported on the ground that it gives an extra source of income to doctors. The analogy that Mr. Young draws with food is quite apt. Efficient medical attention is essential, but it is neither so essential or so universally required as food. Surely therefore, according to Mr. Young's argument, it is necessary that every citizen should get his food free and standardised even more than his medical attention? But in fact we know this is neither intended nor desirable. We do not expect to live all the time on basic rations, nor do we wish all the time to be compelled to have standardised compulsory medical service. Progress demands that we give the fullest liberty for improvements to be made—luxuries they will be considered at first, just as baths, handkerchiefs and clean linen used to be considered. Before long however the state patients will demand and obtain them. Furthermore "Lady B." is a human being as much as anyone else, and those who do personal medicine know that treatment which is not willingly accepted is seldom so satisfactory as when the patient cooperates. Why then should she be compelled while she is ill, when she is allowed to be free while she is well?—especially if we can so work it that her desire for special treatment may be used to raise the whole standard of treatment for others.

Lady B. may be largely a social problem. But how about the busy civil servant, the company director and many others whose time is valuable to the community as well as to themselves? Are these to be forced when they have a trivial ailment—which may not be so trivial—to attend a health centre and waste their time waiting their turn instead of asking the doctor to call at a convenient time? Or if, for the public benefit, they are to be allowed this privilege they will not be treated the same as others, and the whole basis of the unified service breaks down. It is probably impossible to make a comprehensive system which shall be absolutely just and logical, but life is not all logical by any means, and the financial standard is one which is well understood and is a modeately rough guide. If those below the NHI limit were also allowed to opt into the contributory scheme it is most likely that many would elect to pay the extra four or five pounds per annum required on top of the government contribution. They would value the extra conveniences of private practice, the avoidance of waiting for relatively trivial attention, the extra comfort of nursing-homes, &c. The doctor might reap some monetary advantage from having such patients, but the great advantage he would gain would be the ability to see a patient without the state being a tertium quid, and the patient would gain the same inestimable benefit of feeling free. (*I do not here refer to freedom of* choice which could, I think, be as obtainable under a state scheme as in present circumstances.) The danger of all planning, as even the Fabians from their latest symposium, are coming to recognise, is that people may lose their freedom, and it is their individuality that a doctor should seek to cultivate as an essential part of their health. And the state should do its utmost to help them in this for the sake of its own political vitality and health: for states can be sick as well as individuals, and mental and moral sickness is even worse and more intractable than physical illness.

Winsford, Cheshire. W. N. LEAK.

SIR,—Mr. Lucas Young pointed out the difficulties of a medical practitioner under a state scheme wherein the whole population is compulsorily taxed to provide the (at present) ethereal boons of state medicine.

He assumes that it might be possible for a patient to pay extra to the state doctor to get a little extra attention. The policy of allowing a panel patient to go to another panel doctor for "private treatment" has always been a doubtful one, and it is presumably on this analogy that the state doctor might be allowed some such privilege. But, as Mr. Young shows, its working would be so difficult as to make any such arrangement most undesirable. The state doctor must be content with his state lot—or lottery. He cannot run with the state fox and hunt with the free practitioners.

For one cannot agree with Mr. Young's conclusion that all must be of the state. To begin with, there are still a very large number of practitioners who joined the profession under the impression that it was a free one. To force them into a whole-time salaried service seems highly unjust, even for the compelling ideas of the state. Further, the presence of a free profession alongside the state doctors is eminently desirable as a competitive stimulus to both parties. Where private practice and state doctoring run side by side, as in many Crown Colonies, it is the private practice that gets all the best of the work, even though there are many able doctors in the Colonial Service. Nor can there be any objection to a free profession on any ground except the prejudice in the minds of the Whole-time State Slave wallahs.

Perhaps the real objection to Freely Practising Doctors is that it would give the whole miserable show away. For the presumptuous assumption of the Beveridge report that doctors must be available for everyone is only an underhand method of taxing everyone to pay for those who like a few penn'orth of state dope—about six penn'orth a time at the present rate of panel pay—very cheap. The existence of free doctors would imply that all would not want the state doctor. The chances are that the implication would be right, and that no-one would be seen near a state doctor if he could afford a free doctor.

Perhaps the most pertinent argument for the free doctor is that, unless he exists, anyone with a little money will be driven to the Continent or to America if he wants a little first-class private practical medicine. And no doubt he will be catered for. The patient might argue that if he is willing to pay for a little personal attention, he is going to see that he gets it.

In contemplating the whole rather unnecessary business of state medicine one is impressed by the failure of the panel system. If the state had originally undertaken to pay the doctor at "piece-work" rates for what is fundamentally piece-work, instead of endeavouring to extract the last ounce of work out of the doctor for a sweated salary called "capitation fee." it would have had a more rational basis to work on and might have bred something other than distrust in the minds of those who originally entered a free profession.

Chiswick, W.4. THOMAS NELSON.

THE GOVERNMENT AND THE PROFESSION

SIR,—The Annual Representative Meeting of the British Medical Association has agreed upon certain principles by which any Government proposals for reconstruction of the health services are to be judged These principles would restrict progress to a postwar "two way extension" of National Health Insurance This is considered by the ARM to be a step towards the implementation of Assumption B of the Beveridge Report

The public, however, is becoming increasingly aware of the deficiencies of the medical services, which do not allow of a full application of modern medical science to the prevention and cure of ill health Further, many doctors are coming to realise that their working conditions hinder professional efficiency

The proposals of the Beveridge report have offered to our profession great opportunities to contribute to social progress, which it has not yet seized The proposals of the annual representative meeting, indeed, are likely to impede rather than be a step towards the comprehensive health service promised by the Government The decisions of the ARM have not been well received by the public, and the continuation of an unhelpful attitude on our part must inevitably injure the status of the profession

In the absence of the white paper the ARM discussions this year had an unreal quality There is ample evidence that if and when positive and progressive proposals are actually put before the profession by the Government, there are sufficient medical men to ensure that these proposals receive careful and sympathetic *consideration and to cooperate in working a* progressive scheme

The signatories therefore urge the Government to produce without delay the promised white paper, which they

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those

letter to join them in expressing their support of this view

238 MEMBERS OF THE BMA

The names appended to this letter are —

Grace J Adam Robert Adam, *Alice Akred*, M S Aldridge, M B Alexander, T H Almond, D Arning, O F H Atkey

E T Bailey, J Shackleton Bailey, J B Bairds, F Ballkwill, G Barasi, M L Barst, John Bee, A C Belfield, R H Bembridge, T H C Benians, Ruth Bensusan Butt, *J Bentinck*, C A Birch, George Black, D G de Bouk, Brian Boyd Cooper, D S Brian Brown, G Brown, E Vipont Brown Harold Buckley, Clifford F Bullend, O Bulloch, A C S Burch, H H Bradley

A N Cameron Esther Carling, H E Carmalt, W Chadwick A J Clarke T M Cole, S Cochrane, W A L *Collier*, V L *Collins* W F Cooper, B Couts, J H Crawford, Georgette Crosby, C K Cullen, W E Chiesman

John Davenport, Ann Davies James P Davies, J O F Davies, A W Davison L F Dolany, W Pointon Dick, D Lawson Dodd E G Dolton T E Dorran Frances *Drew*, *Margaret Duncan*, *James* Dunlop M H Dyson

N B Eastwood, I Eban, A M Edwards, Gilbert Elliott, I J Eppell

J L Farquharson, J Faulkner Nancie Faux, J Fettes, J Fielding J Fieldman L Fieldman Samuel Fine, Mary Fisher P Fourman W W Fox T L Frank, L M Franklin C Fraser, Y Friedl, I Frost L S Fry

H Gainsborough Patricia Gardner G H Gange, B Gans, J A Gillison, H M Glover, W N Goldsmith M Gordon, T Garland, Martin A Goodwin, S Gottlieb G M Gray, L M Green, F D Griffiths

A Hancock, B M Hearty, C P Hearty, Dora M Hill, W Hinds, B Hirsh, S Hodgson R G S Howe S R Hulton, J H Humphrey

P Inwald

M Jacob, A L Jacobs A S Jarman, T Francis Jarman, M B Jay, E Clifford Jones, J C Jones, H Joules

P Kaplin, S Kaye, I J Keidan, F F Kelly, F Kerner P Kidd, E W Kirk, J H Kirk, Brian Kirman B Klempamo

Norman Lawrie A W Lees, S Leff, J G L Etang, Harold Lewis, J Liddell, S J Lipetz, F J G Lishman, R C Lowe, I M Lucas G R W M Luntz, R A Lyster

Alison MacBeth, C MacDonald B C Macirone, A E *McCandless Donald Macleod*, A R McGregor, James McNabb H H MacWilliam, Joan Malleson, R A Manclark, M Marcus, L M Masterman, G H Miles, E H M Milligan, E Minalt, D A Mitcheson, L J Moir, E Montuschi, H Munro, D Munro Ashman, J J Murnane A L M Morrison

W D Newcomb, Peter Nash, M Newfield Edmund I Newman, N Newman, R Nuki

S O Boyle, Greta Olsson, G M Osborne, R L Osmaston, James O Connor

Joseph Parness J F Payan, Mary E Pearce, B Perchman A Phillips L Phillips M R Pollock, H W Pooler, R Poots, Janet Posner J Powell Evans, J D Proctor, D M Pryce Anthony W Purdie, R F Price

R H Rankin, Alexander Reid, M P Rhodes, J Robinson, H D Rosenberg J Ross Kathleen Rutherford, V C Robinson

R Schultz, F E T *Scott*, J A *Scott* C I *Schiff*, R P W Shackleton, W J Sheehan, A I Silverman, B Singh, F E Smith, S Smith D H Smyth, E Snell, Arnold Sorsby, Max Sorsby, M Stein Wm Stott, J Mitchell Stuart, Barnet Stross, H W Swann, F A H Simmonds

E N *Taffs*, F *Taylor* *Evelyn Terry*, M D *Thakore* Felix I Tietze, O F Thomas R H Toothill, D M Trico P Tyror, S M R Thomson

C K Vartan M Le Vay Noel Vinter H E Vickers

M Wayne, David Waxman E Westerlow Joyce M Wigram, E A Worley, R R Wilson, John Winning, A H Wortman

P Yarrow, S L Yates

RETREAT TO 1938

SIR,—We wish to record our profound disappointment with the decisions taken at the Annual Representative Meeting of the *British Medical Association* We had hoped that the ARM would reaffirm its support for a national medical service to cover 100% of the population and that it would develop its 1942 proposals for health centres Instead of that, we have to witness a retreat from the progressive decisions of 1942 to the timid and out of date proposals of *1938* The *BMA has taken one* step forward and two steps back

The recommendation for a two way extension of the panel system would seem to preserve the evils both of crowded panel practice and competitive private practice, while the recommendation that the development of *health centre practice should wait until experimental* centres have been tried out may result in indefinite postponement

We would urge the council of the BMA to reconsider their timid programme not in terms of prewar 1938 but in the light of present aspirations and postwar *opportunities The medical profession resisted the* introduction of National Health Insurance in 1911 Today it appears that our biggest organisation, the BMA, may resist the introduction of a comprehensive medical service as required for the Beveridge plan of social security Are we as a profession, to be blamed for *trying to put the clock back twice in a generation?*

T H ALMOND
M ATKIN
C H ROSENBERG
UNA M CAMPBELL
BALBINA DROLLER
M MIDDLETON

JOHN PEMBLETON
A SMITH
H J WHITELEY
ANDREW WILSON
F R ZADIK

Sheffield

MEMORIAL TO PROF WARRINGTON YORKE —The council of the Liverpool School of Tropical Medicine is to use Sir Robert Rankin's gift of £500 to commemorate the scientific work of the late *Prof* Warrington Yorke They will award a memorial medal twice yearly on the result of the examinations held for the diploma in tropical hygiene

Captain Edward Raymond Stone MD, Washington, RAMC, was posted as killed last March (*Lancet* 1943 i 415) But we are glad to learn that his English namesake, Captain Ernest Richard Stone, MB CAMB, RAMC of Coulsdon Surrey, is alive and well

Obituary

CECIL ROWNTREE

M B LOND, F R C S

UNTIL illness stopped his work two years ago, Cecil Rowntree had a large surgical practice in and around London. He was widely esteemed and widely liked, and he used his talents unsparingly in the campaign *against cancer.*

His father, W. G. Rowntree, was a London practitioner, and he was educated at University College and the Middlesex Hospital. He was well equipped in body, intellect and imagination, and by hard work he gained his surgical fellowship early and became surgical registrar at his own hospital. A gay courageous fighter to the end of his life, he began his fighting career (writes a friend) when on a matter of principle he took a decision which closed the door to quick security and higher appointment. "From then onwards principle and loyalty always came before expediency and personal advantage: he never compromised. He fought for reforms and innovations in all branches of our profession, and was ever ready for change. A rut to him was a grave without the ends. Later in life he expressed himself well pleased with his early choice, because of the friendships, the opportunities and the work it had brought."

Apart from a period of service in the RAMC during the war of 1914–18, this work chiefly revolved round the Royal Cancer Hospital, of which he became senior surgeon, the Dreadnought and Woolwich Memorial Hospitals and the cottage hospitals at Caterham and East Grinstead. Rowntree was a good technician and a dexterous surgeon. He began practice at a time when it was customary to operate on private patients in their homes or in poorly equipped nursing-homes, and he became inured to difficulties; indeed, he liked to work on his own and until later years often operated with only the theatre sister to assist him. The patient always came first in his mind, and he was a pioneer in the use of premedication. Considerate and charming, he made his assistants and his patients into friends. "To him the man was greater than his accomplishment and the sick more important than the sickness." He always listened attentively to the views of younger men and tried to help them. Though he was best known as expert on cancer—especially perhaps cancer of the breast—and he did much to develop the present technique of radium therapy, it was in the wider scope of general surgery that his ideas found full play, and those whom he taught have much to remember him by.

From the launching of the British Empire Cancer Campaign Rowntree was associated with it as representative of the Cancer Hospital. Until two years ago he was deputy chairman of the executive, and as a committee-man he was invaluable. Whatever he said commanded attention because of his thorough knowledge and lucidity, and his tactful way of dealing with difficulties made him an asset in council or on deputation. He did much to steer the Campaign through its years of infancy and bring it to its present assured position. He was also vice-president, and a member of the executive, of the Union Internationale contre le Cancer.

An athlete in his youth, he was a tall, handsome man, of commanding presence both in the theatre and outside it. His yellow Rolls-Royce car—he had the same chauffeur from the beginning—was long a familiar sight, and on social occasions he showed himself one of the best after-dinner speakers in the profession; he could always be relied on for a good and witty speech that was neither too long nor too short. With his wife he made a home which friends were eager to enter and left inspired. e all preoccupations, he insisted on finding time to build up a friendship with his children and to plan and guide their lives and education. He leaves two sons and a daughter. His death on Oct. 14 ended four years of wearisome ill health, from which he knew there could be no recovery; but his friends felt that the victory lay with him.

ANDREW JAMES CAIRD

B SC, M B EDIN, F R C S E

Mr. Caird of Carlisle died at Edinburgh on Oct. 11 *at the age of 52. He was an able, active and versatile* man, whose death will be widely regretted.

Son of the Rev. David Caird, he was born at Perth and educated at the Perth Academy where he was dux. He graduated in arts and science at Edinburgh before taking his MB in 1916, and he gained many students' prizes. Joining the RAMC, he was soon sent to Salonika, and he worked for a year on the rehabilitation of orthopædic and other surgical cases at a convalescent camp. On being invalided home in July, 1918, he continued this interest at Shepherd's Bush under Sir Robert Jones, and also served at the Edinburgh war hospital under Sir Harold Stiles. On demobilisation he became tutor in clinical surgery at the Royal Infirmary and demonstrator in anatomy. His association with Carlisle began in 1920 with a post under the Ministry of Pensions, and three years afterwards he was elected to the staff of the Cumberland Infirmary. Later appointments included those of surgeon to the Carlisle Dispensary, consulting surgeon to Cockermouth Cottage Hospital and the City General Hospital, and orthopædic surgeon to the Carlisle Cripple Clinic.

Outside surgery Caird gave much time and thought to schemes for the welfare of young people, especially in connexion with the Boy's Brigade and the Air Training Corps. Like his father he was a Congregationalist, and he became president of the Congregational Union of the North of England. He wrote verse; his etchings and water-colours were exhibited at the Royal Scottish Academy and elsewhere; and he enjoyed gardening and fishing. He lately lost his eldest son, who was serving in the Royal Air Force, and Mrs. Caird is left with two younger sons.

STEPHEN THOMAS FALLA

M D LOND, M R C P

NEWS of the death of Stephen Falla on Sept. 16 comes from the Middle East where he was serving as a medical specialist. He was 33 years of age, and son of the late Alfred Falla of Guernsey. He qualified in 1933 from the London Hospital, where he was emergency officer before going to the Brompton Hospital as house-physician. He was also house-physician at the Royal Free and resident medical officer at the Royal Masonic Hospital. In 1937 he was elected physician to the Norfolk and Norwich Hospital and assistant physician to the Jenny Lind Hospital for Children. His experience at the Brompton had given him a special interest in chests, but his outlook was broad and in particular he became an adept with the gastroscope. He showed both promise and charm. "He was keen and conscientious" writes a colleague. "in all that he undertook to do," and "his enjoyment of life endeared him to many." He loved music and sailing, and he was an ardent and strong swimmer.

Falla was hon. secretary of the Norfolk and Norwich Medico-Chirurgical Society, and when war broke out he organised a blood-transfusion service for the county and city. Two years ago he joined the RAMC, in which he held the rank of major. He was working in a base hospital, MEF, and lost his life while bathing.

EDWARD HENRY ALLON PASK

M D LOND

Dr. Allon Pask, medical superintendent of the Wrightington Hospital and a consultant tuberculosis officer o the Lancashire county council, died on Oct. 4 at hi home on the hospital estate. He was born at Workso in 1884, graduated in medicine at Sheffield, and later too London degrees. After 15 months of hou at the Sheffield Royal Infirmary and a practice he entered the Colonial Servic to Nyasaland, where medicine was tempered with bi game shooting. He then returned to the Sheffie oyal Infirmary and became senior house-physician and esident surgical officer. After a term at North St. ancras Infirmary as assistant medical superintendent, e finally entered the tuberculc [illegible] ssistant to the late G. B. Dix [illegible] uberculosis Dispensary and Ya [illegible] his was during the period of [illegible] uberculin, about the time wher [illegible] ct came into force. Later he [illegible] ndent of the Salterley Grange Sanatorium, near heltenham, where his chairman was Neville Chamberin. In 1913 he entered the service of the Lancashire ounty Council and was engaged in dispensary work till he outbreak of the late war, when he joined the Forces, turning in 1916 to become the first medical superinndent of High Carley Sanatorium, near Ulverston. n 1931 he was promoted to the newly built Wrightington ospital for non-pulmonary tuberculosis (226 beds), and is responsibilities there were much increased by the onstruction of an EMS Hospital (252 beds) during the resent war. He was also responsible for the dispensary ork in the surrounding Wigan county area, with a [illegible] of 105,000.

[illegible] Pask went to Canada and the United States [illegible] arty of British tuberculosis officers. He also [illegible] at the request of the Ministry of Health, an [illegible] in Germany into the merits of Gerson's [illegible] diet. He was both a good administrator and good clinician: urbane, thorough and competent, he arned the confidence, respect and affection of his olleagues. He leaves a widow.

VICTOR VARTAN MUIR

M B EDIN

Dr. Victor Muir was lost at sea during July when the hip in which he was returning to Nigeria was sunk by enemy action. He was the son of Dr. Ernest Muir, medical secretary of the British Empire Leprosy Relief Association who is at present in charge of the Leprosarium in Trinidad. Victor Muir was educated at George Watson's [illegible] tropical medicine and hygiene and entered the Colonial Medical Service. After holding a house appointment at the Edinburgh Royal Infirmary he was posted to Nigeria in October, 1940. He returned to this country in March of this year and during his leave passed the clinical examination of his MD. He leaves a widow.

Infectious Disease in England and Wales

WEEK ENDED OCT. 10

Notifications.—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 3324; whooping-cough, 1182; diphtheria, 707; paratyphoid, 3; typhoid, 5; measles (excluding rubella), 67[illegible] r influenzal), 569; puerperal [illegible] pinal fever, 37; [illegible] 0; encephalitis [illegible]; dysentery, 253; ophthalmia neonatorum, [illegible] of cholera, plague or typhus fever was [illegible] ng the week.

[illegible]

Deaths.—In 126 great towns there were no deaths from enteric fever, 2 (0) from measles, 2 (0) from scarlet fever, 6 (0) fr [illegible] diphtheria, 58 (10) from [illegible] years, and 18 (5) from [illegible] ntheses are those for London itself.

Liverpool and Birmingham each reported 8 deaths from diarrhœa. There were 3 fatal cases of diphtheria at Wolverhampton.

The number of stillbirths notified during the week was 232 (corresponding to a rate of 35 per thousand total births), including 10 in London.

Notes and News

NEWS FROM CHINA

It is with pleasure that we welcome the reappearance of the *Chinese Medical Journal*, whose publication was suspended in December, 1941, owing to the occupation of the [illegible] anese. War- [illegible] the necessary [illegible], but through [illegible] USA an office [illegible] of which is [illegible] there. It is [illegible] ca quarterly [illegible] at the same time issued in the Chinese language from Chungking, in place of the former *National Medical Journal*.

The new journal is edited by Dr. J. Heng Liu and Dr. Szeming Szo (the latter will be remembered by many former friends and associates at Cambridge and St. Thomas's), and contains many valuable articles and reports related to health conditions and medical services in China under the stress of wear. They include accounts of typhus fever in Kunming and Shanghai, subtertian malaria in Yunnan, the present status of malaria in free China, and epidemic prevention and control. This last article, which has particular reference to outbreaks of plague and cholera, contains a description of the activities of the Weishengshu Anti-epidemic Corps, which, working from headquarters in Chungking, provides mobile units for despatch to any area in which an outbreak occurs. In one year this corps participated in the control of plague in Fukien, Chekiang, Kiangsi and Hunan; of cholera in seven other provinces; of typhus and relapsing fever in Hupeh and Honan; and of various epidemics of meningitis, malaria and smallpox. During this period they administered nearly 000,000 preventive inoculations and carried out widespread measures of investigation and disinfestation.

In connexion with one epidemic of, bubonic plague—at Changteh, in November, 1941—a fact is recorded which raises the possibility of enemy action as an instrument in spreading bacterial war. It is stated that a few days before the outbreak, Japanese planes appeared over the city, dropping packets of grain and rags, and it was in the very districts in which these strange parcels were delivered in this unusual fashion that the epidemic first made its appearance. Dr. R. Pollitzer, epidemiologist of the National Health Administration, who investigated the incident, believed that plague-infected fleas had been embedded in the grain and rags, and that they thus spread to the rats of the neighbourhood.

The journal contains news of various agencies and relief organisations working in, or on behalf, of China during the war, and it is noteworthy that the Henry Lester Institute of [illegible]

In the Students' [illegible] 9) the Prince of Wales's General [illegible] laced among the hospitals of gr [illegible] which as a result of bomb damage or for other war reasons can offer [illegible] logical conditions, neurology, pædiatrics, psychiatry, physiotherapy and dental work. The Middlesex County Council centre for the treatment of venereal diseases is also held at the hospital. Instruction is given in administration of [illegible] orating in teaching. The college is recognised by the University of London as a place for postgraduate study for the MD and MS degrees and for diplomas in child health and anæsthetics. Doctors practising in the neighbourhood are invited to become members and special arrangements are made for their attendance at lectures and clinics—a method of making the teaching hospital the centre of local medical life and interest which might be copied elsewhere.

University of Oxford

In a congregation held on Oct. 14, the following degrees were conferred:

BM, BCh—Thomas Stapleton (in person); G. F. Bader, T. E. S. Stowell, A. J. Watkin, C. E. Davies, Helen M. C. Morley (in absence).

Theodore Williams Scholarship.—An examination for this scholarship will be held in the Sir William Dunn School of Pathology on Wednesday, Nov. 17, at 2 PM. The scholarship is open to any member of the university, who on June 30, 1943, had not exceeded twenty-six years of age and had attended a course in general pathology and bacteriology in the school either in 1942–43 or 1941–42. Candidates should inform the Professor of Pathology before Nov. 13.

University of Cambridge

On Oct. 15 the following degrees were conferred:

MD.—M. J. Clow and A. L. Fawdry (by proxy); H. L. Hoffman and B. L. F. Heydon.

MB, B Chir.—M. C. Cross, Peter Unwin, M. M. Walker, P. A. O. Wilson, A. J. Gray, E. N. M. Johnston, D. C. Sturdy, J. L. S. Smith, P. R. Swyer, C. O. Edwards and A. I. MacLeod (by proxy); and W. V. Bowman.

MB.—J. L. Potts and G. H. Ward (by proxy).

Royal College of Surgeons of Edinburgh

At a meeting of the college held on Oct. 20, the following office-bearers were elected for the ensuing year:

President, Prof. R. W. Johnstone; vice-president, Mr. J. W. Struthers; secretary and treasurer, Mr. K. Paterson Brown; members of President's Council, Mr. James Graham, Sir John Fraser, Mr. A. Pirie Watson, Dr. G. Ewart Martin, Mr. Francis Jardine, and Mr. W. Quarry Wood; representative on the General Medical Council, Mr. Henry Wade; convenor of museum committee, Mr. W. Quarry Wood; and librarian, Dr. Douglas Guthrie.

The following were elected to the fellowship:

William Cowell, MB DURH; Evan Griffiths, MB LOND; W. G. Holdsworth, MB MELB; A. M. Howard, MRCS; S. L. Mann, MB GLASG; A. G. C. Neill, MB EDIN; St. J. G. O'Connell, MB NUI; C. C. Slack, MB LPOOL; and H. B. Young, MB GLASG.

Medical Casualties

The following casualties have been announced recently:

Killed.—Captain H. G. Greeves, MB BELF., RAMC.

Missing, presumed killed.—Surgeon Lieutenant P. H. Colver, MB BIRM., RNVR.

Wounded.—Captain J. H. F. Brotherston, MB EDIN., RAMC.

Prisoners of War in Japanese hands.—Flight-Lieutenant R. A. Cumming, MB ABERD., RAFVR, Flight-Lieutenant A. N. H. Peach, MB BRIST., RAFVR; and Flight-Lieutenant W. N. Riley, MRCS, RAFVR.

Four Years' Plan for Children's Nurseries

The Minister of Health has received a deputation from the National Society of Children's Nurseries on its four years' plan for nursery development after the war. The deputation was headed by the chairman, Major C. H. Nathan, and included Lady Gunston, Mrs. W. H. Norton, Sir Bruce Bruce-Porter, Dr. Björkegren, Dr. Ursula Shelley, Miss Evelyn Pantin, Miss Alma Fox and Mrs. F. V. Enthoven. Mr. Brown promised to give full consideration to the society's representations for postwar nurseries on an extended scale.

Royal Society of Medicine

On Tuesday, Nov. 2, at 2 PM, Mr. S. A. S. Malkin will deliver his presidential address to the section of orthopædics on the contribution of orthopædic surgery to hospital development. Afterwards Major R. Soto-Hall, USAMC, will speak on the training of an orthopædic surgeon in the USA, and Prof. Harry Platt on orthopædic surgery and the future. The section of pathology will meet on the same day at 4 PM, and there will be a general meeting of fellows of the society at 4.30 PM. At the section of history of medicine on Nov. 3, at 2.30 PM, Dr. E. Ashworth Underwood will read a paper on Antoine Lavoisier and his predecessors in the field of respiration and metabolism. On the same day, at 5 PM, Sir James Walton will give his presidential address to the section of surgery. He is to speak on injuries to the common bile-duct and Surgeon Rear-Admiral G. Gordon-Taylor, Prof. G. Grey Turner and Dr. E. R. Flint will open the discussion which is to follow. On Nov. 5, at 10.30 AM, Mr. T. B. Jobson is to give his presidential address on the audibility of the radio voice and the discussion will be opened by Mr. John Snagge and Mr. W. M. Mollison. At the section of anæsthetics at 2.30 PM on the same day Squadron-Leader B. G. B. Lucas will read a paper on pulmonary complications following simple hernia operations. The section of laryngology is meeting at the same hour when Mr. Mollison is giving his presidential address on pain in laryngology. Afterwards Dr. Wilfred Harris, Captain A. G. M. Weddell and Mr. C. P. Wilson are to open the discussion.

British Social Hygiene Council

On Monday, Nov. 1, at 3.30 PM, Sir Walter Langdon-Brown, the president of the council, is to give an address on social biolog [illegible] The meeting will be held at BMA House, [illegible] London. W.C. 1.

Bristol Merger

The committee of management of the Bristol Aeroplane Company Employees Hospital Fund and the council of the Bristol Hospitals Fund (Inc.) have agreed (subject to ratification in accordance with their existing constitutions) to combine and merge their funds and interests and to set up a new amalgamated fund. The governing body of the new fund will consist of the following representatives: 25 employe contributors, 5 employer contributors, 2 from the Bristol an District Divisional Hospitals Council, 7 from voluntar hospitals, 2 from medical staffs, the chairman of the Bristo health committee, the Bristol MOH, 2 from the University o Bristol, 2 from the Bristol Trades and Labour Council, and 1 from the Bristol panel and local medical committee.

Medical Honours

The following awards have been made to medical officers:

OBE (military division).—Lieut.-Colonel H. W. Farrell, FRCSE, IMS.

DSC.—Surgeon Lieutenant M. J. Hood, MB GLASG., RNVR.

Hood was serving in a destroyer. While she was on convoy escort duty last winter a signal was received from another escort ship asking for medical attention for injured men. Icing conditions made it impossible to get seaboats away and the only alternative was for one ship to go alongside the other. This was achieved, but owing to the wind and swell it was dangerous for both ships to remain together for more than a matter of seconds. As the vessels, both of which were covered in ice, closed, Hood jumped from one ship to the other. One slip might have cost him his own life. Then for 30 hours he worked unceasingly among the wounded. His operating-table was the table of the seamen's mess-deck, and to help him to keep a steady hand as the ship pitched and rolled, two ratings supported the doctor as he worked.

Appointments

CONNELL, J. S. M., FRCSE: surgeon to the gynæcological department of the Walsall General Hospital.

BRAMWELL, B. R., MD MANC., MRCP: [illegible] court districts of Downham Mark [illegible] Holt, King's Lynn, North Wa [illegible] Thetford and Wymondham (circuit No. 32).

JONES, A. M., MRCS: medical referee for the county-court districts of Bangor, Conway, Llandudno and Colwyn Bay; and Llanrwst.

TERRY, ELSIE M., MD LOND.: asst. surgeon to the gynæcological department of the Walsall General Hospital.

WALKER, M. M., MRCS: asst. M.O in Kingston Public Hospital, Jamaica.

Births, Marriages and Deaths

BIRTHS

BOWEN.—On Oct. 17, at Barry, Glam., the wife of Mr. J. Glyn Bowen, FRCS—a daughter.

ILES.—On Oct. 15, at Cairo, the wife of Major J. D. H. Iles, RAMC, of Starcross, Devon—a son.

JACKSON.—On Oct. 14, at Oxford, the wife of Lieutenant C. R. S. Jackson, RAMC—twin sons.

LANGMEAD.—On Oct. 22, the wife of Dr. L. B. Langmead, of Tunbridge Wells—a son.

MALING.—On Oct. 22, at Kew, the wife of Lieutenant P. B. Maling, GM., RAMC—a son.

MARRIAGES

DAWSON—HOGG.—On Oct. 23, in London, William Watson Dawson, MB, of Wantage, Berks. to Josephine Stuart Hogg.

PAYNE—LOVELACE.—On Oct. 16, at Chichester, Cyril Ernest Reginald Payne, surgeon lieutenant, RNVR, to Mary Lovelace, of Claygate, Surrey.

TATTERSALL—TOWNEND.—On Oct. 16, at Chiswick, William Horrocks Tattersall, MB, of Blackburn, to Joan Novello Townend.

WATERS—BLYTON.—On Oct. 20, Kenneth Fraser Darrell Waters, FRCSE, to Enid Blyton.

WILLINGTON—MATHEWS.—On Oct. 11, in Dublin, Frederick Lane Willington, major RAMC, to Joan Mathews.

WILLMOTT—MANSFIELD.—On Oct. 20, at Cambridge, Leslie Arthur Willmott, captain RAMC, retd, to Helen Mary Mansfield.

DEATHS

BATTEN.—On Oct. 22, at Hampstead, Rayner Derry Batten, MD LOND., aged 85.

JONES.—On Oct. 21, at Bath, Philip Theodosius Jones, MRCS.

MANN.—On Oct. 22, Fairman Rackham Mann, MRCS, surgeon commander, RN retd, of Tasburgh, Norwich.

PRITCHARD.—On Oct. 20, at Exmouth, Eric Pritchard, MD OXFD, FRCP.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.

TREATMENT AND THE PATIENT

LESLIE COLE, M D CAMB, F R C P
PHYSICIAN TO ADDENBROOKE'S HOSPITAL, CAMBRIDGE

IT has been said that "The first part of treatment is diagnosis, and the second, diagnosis, and the third, diagnosis"—an overstatement which expresses a great truth but is sometimes taken too literally. It is true that right treatment must be based on correct diagnosis, but it does not in the least follow that the best treatment follows automatically.

In a previous paper[1] I tried to show how every step in diagnosis is a part of treatment (because the manner in which each step is managed is liable to influence a patient's attitude to his disease) and then to consider how far diagnostic methods are rightly applied today. I propose here to pursue my inquiry further and to consider in what essentials of treatment mistakes are often made. I attempt this with the full realisation that there are many who do not make these mistakes, that to generalise on such a subject is dangerous and that there is hardly any rule pertaining to it which cannot be justifiably broken on occasion.

SENDING PATIENTS TO BED

Some doctors spend their lives sending patients to bed and by the zeal and energy which they devote to it establish unshakable reputations for prudence. But bed is such a dangerous place for the aged, and so irksome for the young, that it is worth discussing some of its pros and cons.

It is wise to send a patient to bed when he has a temperature, a general infection even if the temperature is normal, a local infection of more than a certain degree of severity; when there is severe under-nutrition; when the work of the heart, lungs, kidneys or other organs needs to be reduced to a minimum, and when injuries either external or internal have to be healed. Bed is also useful as means of securing physical and mental isolation and rest and for observation when a case is undiagnosed.

The disadvantages of prolonged rest in bed are considerable and increase with weight and age. Skeletal muscles grow weak and lose their tone, the quickness and efficiency of occupational reflexes is impaired and circulatory efficiency is diminished so that the power to do physical work is temporarily limited. In patients with a tendency to fibrositis or arthritis, fascial sheaths adhere and joints stiffen. If for any reason the chest is immobilised there is a risk of hypostatic pneumonia. The slowing of the circulation, particularly if there is an infection, predisposes to thromboses and prolonged recumbency to bedsores. Stasis is produced in internal organs with resulting constipation, deposit of urinary crystals and formation of calculi in the urinary and biliary tracts. In some people rest in bed leads to a steady increase in weight when it is least wanted and this in itself is a great handicap later in many ways. Finally, prolonged rest in bed may lower morale and in some produces morbid anxiety.

When sending patients to bed these pros and cons should be carefully weighed, particularly in regard to each patient's character, temperament and constitution as well as to the disease he is suffering from. Prolonged and complete immobilisation should always be avoided if the disease allows it, and full movements of joints, changes of posture and deep breathing systematised daily. This is particularly desirable in old people and those who are physically sluggish, and before sending such completely to bed it is well to consider whether an equally good result cannot be obtained by restriction rather than complete curtailment of effort. This is not to say that prolonged rest in bed is not often necessary and desirable, but to emphasise disadvantages which are often forgotten and which can be avoided if remembered.

There is another aspect of sending patients to bed which is sometimes at the back of the doctor's mind, and that is that death in bed reflects more credit on his judgment than death in harness. To die boarding a tram while under medical treatment is in a sense the medical equivalent of death on the table. Both are to be avoided as far as possible, but by excessive cautio too high a price can be paid. Many patients, particularl old people, probably live longer, and certainly mor happily, if they are encouraged to be active to the end o their lives.

GETTING PATIENTS UP AGAIN: CONVALESCENCE

The return to normal life after severe illness should b a graded systematised process regulated by the physica and temperamental response to each increase in effort If progress is pushed too fast there is a risk of physica exhaustion and the disappointment and discouragemen which accompanies this. On the other hand too timi an advance carries with it an at least equal risk o prolonged feebleness and unnecessarily delayed recovery The ability to choose the right course between thes extremes is a quality in the doctor which helps to prevent anxiety neuroses after a long illness. Every patient presents such an individual problem that rules of procedure to elaborate the above principles are less useful than most generalisations. Generally speaking patient are kept completely in bed for too high a proportion o the total time they are off work, they are too inactive in bed during the period before they begin to get up, and the transition from complete rest to activity is too sudden. When they get up their progress should be regulated according to plan, so that they are educated gradually to the degree of effort they will need when they start work again. During this stage of the illness considerably more supervision and direction by the doctor may be needed than in earlier stages when complete rest is unavoidable.

Much chronic ill health following an illness is due to [illegible] itself tends to foster. [illegible] clearly recognised that [illegible] h as chronic headache [illegible] jury, chronic dyspepsia [illegible] rm than good and that *speed* and accuracy in diagnosis are important to kill anxieties before they can germinate. After a severe illness anxieties can often be prevented if care is taken to warn patients what they may expect during convalescence. If a patient is warned that he may feel weak when he first gets up he is pleased and encouraged when he does not and takes it as a matter of course when he does. If he is primed with false optimism, depression and a sense of failure follow. It is at this stage in an illness that the doctor's confidence in himself, based on accurate diagnosis and prognosis, is so valuable to the patient.

There is one troublesome and delaying sign after an illness which is worth separate mention because it so often delays progress, and that is the temperature that will not quite settle. In assessing the meaning of this the sedimentation-rate is a useful ancillary which might be used in general practice more than it is.

DIET

Th[illegible] need [illegible] does [illegible] are [illegible] good because they reduce weight rather than because [illegible] bnormalities for [illegible]. To avoid un[illegible] iewed from four points of view: completeness, energy value, idiosyncrasy and the way it is eaten.

Completeness.—Every special diet should contain all the essentials of a normal diet: vitamins, salts, proteins, fats, carbohydrates and water. In compensating for one abnormality it is important to avoid producing another—for example vitamin-C deficiency in a gastric ulcer diet.

Energy value.—This is perhaps the most important consideration because it is most often forgotten. The amount of food must be based on knowledge of the patient's occupation and habits, his actual weight compared with his required weight, *and how he f* after taking the diet for a trial period. [illegible] who are given special diets, especially [illegible] made suddenly and without regard [illegible] habits, feel weak from lack of food. [illegible] the case in conditions like diabetes, [illegible]

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[1] *Lancet*, 1943, i, 163.

Sudden drastic reduction of protein in conditions like chronic nephritis and arteriosclerosis is liable to produce a feeling of weakness in those who have previously eaten to excess. While excess should be avoided in such conditions there is no evidence that it does harm in strict moderation even in the form of red meat. Dieting to reduce weight has a wide application in many different conditions, but restrictions are often made too suddenly and drastically. If food is gradually cut down until the patient's weight shows a steady fall the diet has often only to be maintained at this level until the required weight has been reached. A somewhat fuller diet may then be allowed but it should be controlled by regular weighing of the patient. It is more important to weigh the patient than the diet. The present war has provided a mass experiment in weight reduction by diet and although there are other complicating factors and the experiment is not controlled, the effect on the health of the people, particularly the middle-aged and elderly, appears to have been good.

Idiosyncrasy.—Knowledge of intolerance to particular foods whether due to allergy or natural aversion can most easily be gained from the patient. These will be avoided if every new diet is based as it should be on a study of the old. This may also reveal increased tolerance to certain foods which may be useful.

The way food is eaten.—Many errors in diet are due not to quality and amount but to the way in which the food is eaten and the conditions under which it is served. Thus spacing and regularity of meals, time spent over them, excitement and work during meals, rush and hurry immediately afterwards and the regulation of smoking and alcohol need more attention. Often rearrangement of the day's routine rather than alteration of food is what is needed.

PURGING

The prevalence of "constipation" is due partly to a misconception of the term, so that anyone who does not toe the line with the rest in having a bowel action once daily is taught to regard himself as constipated, and partly to interference with the factors which produce regular action of the bowels. These are: roughage, plenty of drink, plenty of exercise, freedom of opportunity and freedom of posture in defæcating.

The diagnosis of constipation should be based on the individual's natural bowel action and this need not be a daily one. Mere regularity is not a reliable guide; the amount and consistency of the stools are important, and a feeling of well-being is most important of all.

In treating constipation the normal for the patient is the base-line which first has to be found. Any deviation from this should be corrected if possible by additional roughage, increase of fluid and exercise and establishment of habit which under civilised conditions must take the place of freedom of opportunity. Freedom of posture is more difficult to arrange outside camp, but the squatting posture—allowing of greater muscular effort with greater protection of hernial orifices—is important in developing the abdominal muscles. Only when such measures fail should purgatives be resorted to, and these should be as little irritating as possible and limited to the necessary minimum. What often happens is that the base-line is never established but treatment of "constipation" with purgatives, often drastic, is begun before it has ever been present, while lack of roughage, fluids and exercise is allowed to go unchecked. An irritated bowel results which to some becomes a focus of anxiety with further loss of mental health and physical efficiency.

BAD POSTURE

Bad posture is the cause of much ill health and ugliness and may in time affect every system of the body. To realise its prevalence it is only necessary to stand for a few minutes in a crowded street and watch the people. Poor chest expansion and incorrect breathing predispose to chest infections and indirectly to venous stasis and diminished circulatory efficiency because efficient respiratory movements help to return the blood to the heart. An upright carriage with free supple movements of the spine and limbs tends to prevent fibrositis in middle age [illegible] unhealthy deposition of fat—the whole vicious [illegible] of increasing stiffness and obesity with diminishing [illegible] and circulatory efficiency.

The importance of early recognition and correction of all postural abnormalities is as yet only realised and practised by the few. Students and many doctors tend to focus their examination on the heart, lungs, abdominal organs and nervous system at the expense of the skeletal and muscular systems: to look for murmurs without looking at the spine or watching to see how the patient stands, walks and breathes. The latter evidence considered in conjunction with occupation, habits and environment will give the answer to many clinical problems both of major and minor ill health. In any future policy of preventive medicine or "positive health" the diagnosis and early treatment of postural deformities should be given a prominent place, not only for young people but also for middle-aged and elderly.

As examples I will cite two specific conditions in which physical treatment should be used much more. Enlarged tonsils and adenoids are often associated, either as cause or effect, with mouth-breathing, poor chest expansion and postural defects. Operation, although it may lessen the tendency to frequent colds, does not automatically cure the secondary defects, and when these are present should always be followed by appropriate exercise to ensure that breathing and posture are at once corrected. Asthma also is commonly associated with faults of posture and breathing and their correction is nearly always an important adjunct to other treatment.

THE USE OF DRUGS

There are now a large number of drugs with powerful and specific bactericidal or pharmacological effects; and, given a correct diagnosis and knowledge of the special conditions under which they act, their use should be comparatively easy.

Consider the following five examples: iron in microcytic anæmia, liver extract in macrocytic anæmia, sulphapyridine in pneumonia, glyceryl trinitrate in angina pectoris and mersalyl in cardiac œdema. What are the main criteria with each for success? Iron should be given in large doses continued long enough to correct the anæmia: in certain patients it may be necessary to continue it at intervals. Liver extract should be given in doses large enough to restore the blood-picture to normal and then be continued, usually for life, in doses large enough to maintain it. When lobar pneumonia is diagnosed the appropriate amount of sulphapyridine should be concentrated over a week or ten days with the heaviest dosage at the beginning in order to knock out the infection before it has time to become resistant to the drug. Glyceryl trinitrate may be given not only for severe anginal pain but also at the slightest premonition of pain and even regularly as a prophylactic. Mersalyl may be given not only for gross cardiac œdema but to patients with threatening congestive failure in whom an increase of symptoms and an increase of weight herald a relapse. When a good response is obtained the drug may usually be given safely every three or four days until the œdema has disappeared completely.

All these drugs are used commonly in practice but often not to the best advantage. This is nearly always because either the dose is not large enough to begin with or is not continued long enough.

The practice of giving combinations of drugs, although not in itself bad, is liable to lead to inefficiency. For example, in a few patients a mixture of vitamins, iron and liver extract will have an optimum effect; but most require either iron *or* liver and the giving of combinations usually results in too small a dose of the one essential which is not compensated for by the other ingredients which are relatively or quite unnecessary. Another disadvantage of using combinations of drugs is that therapeutic effects are inevitably blurred because it is impossible to say which particular ingredient is responsible for the result. To avoid this confusion it is a wise working rule to determine each patient's response to a drug used alone, and once this has been established appropriate combinations may often be given.

A drug may be given for its specific effect when the diagnosis is certain or as a placebo in an undiagnosed illness, and between these two extremes are many shades and gradations. Some prescriptions are a queer mixture of science, empiricism, tradition and superstition. This is partly because a doctor is often expected to give or feels it is wise to give medicine when scientifically there is no indication for it. Economy of time is also a consideration, for advice plus medicine can usually be given more expeditiously than advice by itself. Thus the writing of a prescription may be in a sense an escape mechanism for the doctor.

When a drug is used the dose must be large enough. Morphine which fails to relieve pain or potassium citrate to make the urine alkaline are ineffective gestures which may do more harm than good. With dangerous drugs effective dose cannot always be safely given at the set because the individual patient's response is not own and the error if any must be on the safe side. e method of trial and error should then be applied til the safe and effective dose is found. It is sometimes gotten that the official dose has got to be modified d the test of the right dose is whether it works. .

When drugs are given for empirical or traditional sons it is important for the doctor to be honest with nself and face the lack of facts. If he can do this medicine will do him no harm and may still help his tient.

FOCAL SEPSIS

The discovery that some chronic diseases are caused a localised focus of infection in such organs as the th, tonsils, nasal sinuses, urinary tract or gall bladder, d that they can sometimes be cured if this is eradicated, ve a new object for therapeutic effort. Hunting for a apegoat has its charm and perhaps that is why this ional idea is sometimes pursued with such irrational thusiasm. Now after twenty years it is easier to see w limited are the worth-while results obtained and at discomfort, pain and sometimes disaster result m ill-considered action in eradicating supposed septic i. Medical opinion on this subject has veered to the ht in the last few years but there is still a good deal of -or-miss treatment of suspected focal sepsis which does e patient more harm than good and might with greater nsideration be avoided. To lay down general rules out the treatment of focal sepsis is difficult. When wever a suspected focus is present an attempt to swer the following questions will help to prevent istakes:

1. Is there any other more obvious cause which should be ated first?
2. Is there any time relationship between the onset of the al and the general infection which suggests an association tween the two?
3. Does an exacerbation of the local infection cause any neral effect?
4. Is either the local or general infection so chronic that it unlikely that treatment of the former can effect the latter?
5. Is the local infection so severe or of such a nature that attempt to eradicate it may do harm?
6. Is there any direct anatomical association between the o? (e.g., sinusitus and bronchiectasis).
7. Is the association merely accidental?
8. Is the patient's general condition such that the risk of cal treatment may be out of proportion to possible benefit?

All these questions cannot be answered in every case, t if they are *considered* as a routine before any operation r focal sepsis much unnecessary suffering would be evented.

DENTAL TREATMENT FOR GENERAL DISEASE

Among many possible sources of focal infection the eth are often suspected and treated. In doing this eir true function is often forgotten and mouths are eared on a rather ill-founded hope of curing some neral infection or vague ill health. Wholesale clearnce of comparatively healthy mouths is to some extent rced on the doctor and dentist by social conditions; present it is difficult for poor people to get false eth except as a complete upper or lower set, so that l-or-none law as applied to teeth is a recognised adition. Even allowing for financial limitations in curing adequate dental treatment, ill-advised dental [illegible] the bad features [illegible] a general infecon is a dual one only properly made by cooperation etween dentist and doctor. Dental efficiency and oral ygiene in themselves are mainly problems for the rmer; the effects of dental sepsis and deficiency on the general health, mainly for the latter; but the spheres of each overlap. I am only concerned with the doctor's part. To answer the question of when and what dental treatment is necessary the doctor should consider the questions already asked in relation to focal sepsis in general and also two further ones:

9. If extensive extractions seem necessary, what is likely to be the general effect on the patient?
10. Can satisfactory false teeth be provided either at once or later? (To be answered by the dentist.)

Often it is a choice between removing a few teeth only and leaving an inefficient set, or clearing a whole jaw with the prospect of a complete denture after several months.

Finally it is worth enumerating some of the general ill effects which may follow dental extraction such as:

1. Exacerbation of a local infection—e.g., fibrositis, arthritis.
2. Initiation of a general infection—e.g., infective endocarditis.
3. Aspiration effects—e.g., bronchopneumonia, bronchiectasis, lung abscess. (Usually after multiple extractions of septic teeth.)
4. Various forms of dyspepsia—e.g., exacerbation of a quiescent peptic ulcer. (From swallowed septic material or because from lack of teeth or inefficient dentures food cannot be properly masticated.)
5. Psychological effects from loss of teeth (and beauty in young women).

I do not wish to imply that any of the above are a common sequel to dental extraction but merely to review what as possibilities should be kept in mind—just as one keeps in mind the complications of scarlet fever or pneumonia. To do this will help to avoid them.

TREATMENT OF MULTIPLE CAUSES

As a diagnosis is complete and accurate only when it includes *all* the disorders which are present, so treatment will be the best only when all these are treated. In gross combinations of disease, such as cerebrospinal fever in a diabetic, treatment both by sulphapyridine and insulin is essential and the omission of either may mean death. Many patients however suffer from combinations of trouble which are less obvious, and sometimes there may be several major or minor treatable conditions, all contributing to a single syndrome in the same patient. Omission of treatment of only one of these may be responsible for total failure, the difference between returning to an active life or remaining an invalid.

Here are some more examples. Angina pectoris may be due in the main to coronary sclerosis, with anæmia, obesity and tobacco as contributory factors. Freedom from symptoms and a return to a useful life may be secured if the obesity is treated by a reducing diet, the anæmia cured by iron and smoking stopped. On these lines glyceryl trinitrate may be superfluous. On the other hand the use of glyceryl trinitrate alone without attention to the other three factors may give temporary [illegible] ss may be caused [illegible] visceroptosis and [illegible] y when all these are treated; chronic bronchitis is often combined with chronic sinus infection, bad posture and breathing; and gastric ulcer with oral sepsis, dental deficiency and secondary anæmia. Varicose veins and piles are often associated with visceroptosis, constipation and obesity and to cure them it is not enough to inject the veins but it is necessary [illegible] to venous st[illegible] due to seriou[illegible] slight abnormalities. Thus headache may be produced by the summation of eyestrain, oral sepsis, dyspepsia from an unsuitable diet, and the menopause.

[illegible] by [illegible] on [illegible] head-injury a chronic ear lesion which has previously been symptomless may give rise to pain and giddiness, or after laparotomy chronic constipation which has previously been painless may cause colonic pain. The trauma, perhaps by focusing attention on the particular part, lowers the threshold for pain so that stimuli which have hitherto passed unnoticed reach consciousness. It is important to recognise this double cause because a simple explanation to the patient will often cure when direct treatment of the symptom has failed.

These facts are well known but many failures occur because they are forgotten or ignored. To put them into practice a high standard of history-taking and systematic examination are essential and, as Sir Farquhar Buzzard[2] has pointed out, lack of time rather than lack of skill is often the cause of omissions. When one or two likely or probable causes of a symptom have been discovered the examination is not pursued; other contributory factors are missed and perhaps only looked for at a later examination when the patient comes back unrelieved. This method, although at times unavoidable, is bad; for it often means that cure is delayed because the first examination and treatment was incomplete.

EXPLAINING TO THE PATIENT

As many failures in treatment are due to the fact that significance of the results of elaborate investigations are not made clear to the patient, so treatment is not properly carried out because the simple ideas on which it is based are not clearly explained. Understanding is the basis of cooperation and without it much modern medical treatment is impossible. Failure to explain basic principles rather than detail is the commoner error, and indeed too much detail masks principle.

In most sections of the population peptic ulcers relapse not because patients cannot get the food ordered but because they have not been taught to eat it in the right way, under the right conditions at the right time. Diabetics develop coma or hypoglycæmia because they have not been taught or learned enough about the management of their disease. Those with pernicious anæmia relapse because they have not learned that they must never stop their injections of liver extract. Epileptics relapse because after a few weeks' freedom from fits they stop taking their phenobarbitone. These are some examples of failure in the technique of teaching the patient—failure to explain in simple terms why certain things should always be done, and the results likely to follow if they are not. Almost every practising doctor would admit the truth of this but what is not appreciated to the extent of putting it into general practice is the extreme importance, not merely of telling but of teaching the patient how to look after his own health. In many cases the final result depends not on whether the doctor knows the right treatment but on his power of teaching his patient to carry it out. It is no accident that some of the best teachers are also the best doctors, for in teaching their students they are practising their art.

This power depends on many qualities—intelligence, patience, personality; but these may fail if they are not also combined with the ability to speak clear English. This latter is of paramount importance. I am not suggesting that the doctor's command of English is less than that of any other of the learned professions; indeed it is probably greater. What I do suggest is that his need for command of his native tongue is much greater because his most important work involves the interpretation of complicated scientific findings to people of all degrees of intelligence in words appropriate to their understanding. This is an art which demands an exact knowledge of words and ability to use them.

EDUCATION AND TREATMENT

Today while medical education is much discussed and views are controversial there seems to be general agreement that early specialisation in science at the expense of a broader general education is to be avoided; but the specific need for the student to study English so that he may express himself clearly both in writing and speaking, *because* this is an essential part of his work, is less clearly stressed and not enforced. Those who control medical education, once they recognise that this is a need, could do much to meet it by demanding a much greater command of language from the medical student. They should realise that for him the study of the English language is as important as the study of anatomy and physiology, because it is the vehicle which makes or mars all the rest of diagnosis and treatment and indeed can often make or mar research. The ability to say things clearly should be recognised as one good reason for going in for medicine. When a boy decides to do so it should be impressed on him from that moment that he must concentrate on the study of language, and school and university should stimulate this by demanding a higher standard of literary excellence in all examinations. In all these too an essay might be one of the stiffer fences.

Action on these lines would not only raise the standard of general education but by encouraging clear thinking would check those vague, meaningless statements which are so unhelpful to patients and are one of the most serious indirect causes of bad treatment.

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[2] Lancet, 1942, i, 343.

SPLINTING OF THE FEMUR FRACTURED BY GUNSHOT WOUND

THE TOBRUK AND DOUBLE-CUFF PLASTER

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DURING the last 50 years many different splints have been used for fracture of the femur. Their great variety does not appear to be directly due to increasing facility in working wood and metal, but rather to the conditions of life under which the fractures occur.

At the end of the war of 1914–18 it was thought that the use of a Thomas splint had universal approval. The details of its application were taught to first-aid workers in industrial areas and to the personnel of the medical services.

At the outbreak of the present war, it was agreed that this method or a simple modification was suitable for air-raid casualties, and for the wounded, when little time would elapse between application at the aid-post and operation in the nearest operating-centre. As skeletal traction by Steinmann's pin or Kirschner wire was favoured by many under peace-time conditions, it was believed that after operation such traction would be employed and the limb rested in a Thomas splint, the cord from the stirrup being tied to the cross-bar. In fact, this method was in use in May, 1940, in the BEF, but the experience gained was too small to be of value.

The problem in the Middle East was novel in that during 1941 and 1942 the lines of communication were far longer than had previously been usual in theatres of war. The surgery of the forward area was carried out in and around Tobruk, and the usual period before the patient reached the base was 10 days in 1941 and 5–7 days in the first half of 1942. Evacuation by sea was difficult for the case of fractured femur because conditions of "carry" to the pier were uncomfortable and of "loading" often hazardous. A road and rail journey meant rough travel and usually transfers to different vehicles.

The Thomas splint technique was known to the surgeons, but the wounded so splinted stated they had much pain during the journey. Further, surgeons were anxious to employ plaster-of-paris around the limb. In 1941 patients reaching the base from Tobruk arrived in a plaster spica.

The justification for this was that after operation the limb was immobilised by the best-known method and the requirements of the plaster technique as a treatment of wounds were fulfilled. Those employing the spica had a suitable pelvic rest and could apply it quickly.

The objections to the hip spica were that few patients reached the base in comfort, and many had plaster sores on the buttocks, over the dorsum of the foot and over the tendo Achillis. Furthermore, the spica seldom does immobilise a fractured femur during a journey and rarely controls a fracture of the upper third during the first few days. Its application is difficult and requires an expert team. Even so, some time is required both for application and drying. The medical officers with a motor ambulance convoy or an ambulance train do not know what action to take when the patient is uncomfortable, as they are not accustomed to doing fracture work, and they usually decide to off-load such a patient, which adds to his delay in reaching the base. Surgeons at the base reported that these plasters usually had to be removed on the day after the patient's arrival and that an anæsthetic was necessary.

Hence by 1942 other forms of splinting were tried and two of these—generally known as the Tobruk plaster and the double-cuff plaster—deserve consideration. Both were devised for application after operation in a forward area to immobilise the limb during a long journey and experience showed that, provided the detail of splitting the cast was carried out, attention was seldom required during transit and there was no hurry to remove the splint at the base. Although the Tobruk plaster has been employed for treatment at the base, it is not suggested that either method should replace standard methods suitable in static hospitals.

THE TOBRUK PLASTER

The requirements are:

Thomas splint and foot-piece.
Plaster-of-paris bandages (6-inch).
2 bandages, plaster extension for treatment of fractures (one-way-stretch 'Elastoplast').
1 bandage, flannel or cotton, 6 in. wide, 2 yd. long.
3 triangular bandages.
Rubber tubing or malleable metal (length of thigh and leg).
Large pad (of wool or clothing).
Sticky felt or flannel bandage 2 in. wide.

1. After the dressing has been applied in and over the wound, pads of sticky felt are placed above each malleolus and around the tendo Achillis. (If felt is not available, three turns of flannel bandage are passed around the area.)

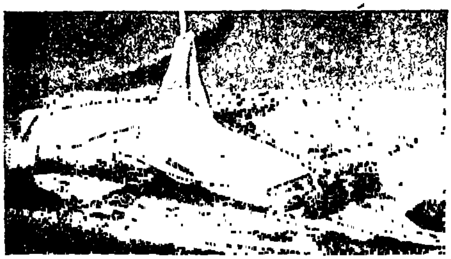

Fig. 2—Plaster applied. Slab is being added to back of cast.

A length of one-way elastoplast bandage is placed along the lateral aspect of the limb. The upper end should be up to the dressing and the lower end is folded in on itself at the malleolar level, so that its breadth becomes 1¼ in. and the end is allowed to hang free. The bandage is moulded around the lateral part of the limb (as it will stretch sideways and not in length) and "rubbed into" the limb so that it fits snugly. A second length is placed on the medial side of the limb and made to adhere in a similar way. The loose ends are tied together beyond the foot and a weight of 7 lb. is attached and allowed to hang over the end of the table. These two lengths form the *extension bands.*

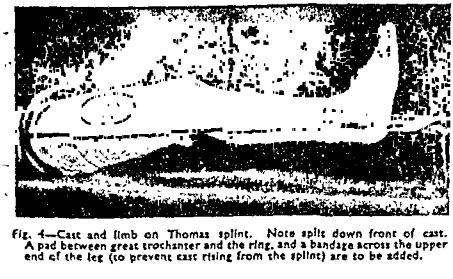

Fig. 4—Cast and limb on Thomas splint. Note split down front of cast. A pad between great trochanter and the ring, and a bandage across the upper end of the leg (to prevent cast rising from the splint) are to be added.

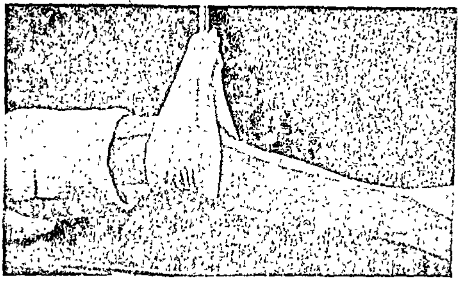

Fig. 1—Extension bands and suspension bandage for knee are shown. (Padding around ankle is not shown.)

2. The 6-inch bandage is passed behind the knee so *that its centre covers the popliteal space and the ends* are held 2 ft. above the knee, so that the knee rests in a sling. The ends are fixed by a cord or odd end of bandage to a pulley or beam so as to take the weight of the limb and hold the knee flexed 5–10 degrees (fig. 1).

3. Greased rubber tubing, ½ in. diameter, or greased metal strip, is placed down the whole length of the limb over the centre of the anterior surface. Plaster-of-paris bandages are passed round the limb, great care being taken that the surface in contact with the limb is smooth. First the leg and foot are covered. Turns are arranged so that the extension bands come through the *plaster just above the malleoli, and the foot is fixed at a* right angle to the leg. The sole of the foot must be covered up to the metatarsal necks; if it is taken beyond the toes must not be hyperextended. The thigh is then covered. Plaster slabs or rope can be incorporated along the sides of the limb to strengthen it (fig. 2). As the bandages converge around the sling this becomes compressed in front of the knee. With a finger, the openings for the elastoplast are stretched.

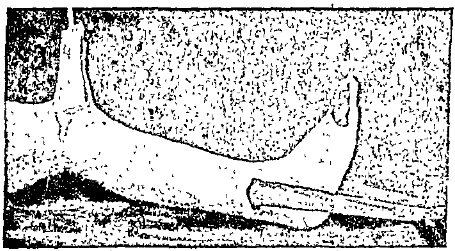

Fig. 3—Plaster completed. Extension bands with adequate opening above ankle shown.

4. Before the plaster is dry the suspending bandage is cut and the limb and cast are placed on two slings, made

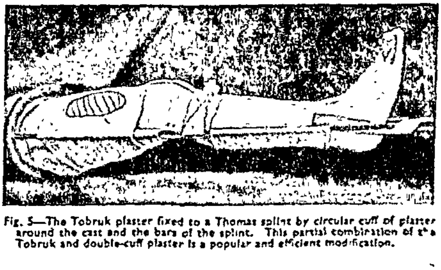

Fig. 5—The Tobruk plaster fixed to a Thomas splint by circular cuff of plaster around the cast and the bars of the splint. This partial combination of the Tobruk and double-cuff plaster is a popular and efficient modification.

from triangular bandages, attached to a Thomas splint. With a knife, a free opening is made around the exit holes for the extension bands, and the plaster is trimmed around the suspending bandage; but that part in contact with the skin can be left in situ (fig. 3).

5. The weight is removed. The Thomas splint is adjusted against the tuber ischii. The loose ends of the extension bands are separated and tied in the usual way over the cross-bar at the end of the splint after the inner band has passed over the long bar and the outer one under the lateral bar. A foot-piece is clipped on.

6. The cast is split from end to end down the front of the limb (fig. 4). If rubber has been incorporated, this is pulled out and the cast cut with plaster shears; but if malleable metal has been employed a knife-cut is made directly on to it.

Three bands of cotton bandage are tied around the cast.

7. A triangular bandage is folded to a narrow-fold and placed over the front of the upper end of the leg and around the bars of the splint to prevent the cast and limb rising off the posterior slings. A large pad is placed between the ring and great trochanter to fill in the space, as large ring splints are used in forward areas.

8. When the patient is transported on a stretcher the splint is elevated from the stretcher by use of the suspension bar.

Notes.—By the use of the weight tied to the extension bands and the knee sling, the limb rests in the optimum position during the application of the plaster and there is no necessity for the limb to be held by any assistant.

The extension bands must be placed direct on to the limb. A common mistake has been to place these between the layers of plaster-of-paris. Traction on such an arrangement causes the cast to press on to the dorsum of the foot and tendo Achillis, so that sores arise.

There is no objection to the outer surface of the extension bands being greased to prevent adhesion to the cast.

THE DOUBLE-CUFF PLASTER

The requirements are:

Thomas splint and foot-piece.
Plaster-of-paris bandages (6-inch).
2 bandages, plaster extension for treatment of fractures (one-way-stretch elastoplast).
Cotton-wool for padding.
Sticky felt or flannel bandage 2 in. wide.

1. Extension bands are applied as in (1) above, but no weight is tied on the ends.

2. The limb is placed on a Thomas splint and the ends of the extension bands tied as described above.

3. A pad of cotton-wool, not less than 6 in. square, is placed above the knee in front and another of similar size behind the thigh below the tuber ischii.

4. Plaster-of-paris turns are taken around the thigh and bars of the Thomas splint.

5. After adequate padding over the skin and front of the ankle, plaster-of-paris turns are taken around the leg and splint from below the knee to a level above the malleoli.

6. A foot-piece must be attached to the splint.

Note.—It is sometimes an advantage to fill the spaces between the thigh and the bars of the splint with wool.

COMMENT

These two methods enabled many patients to travel from the Western Desert to the base, often taking 7–10 days, with greater comfort than was previously possible. The Tobruk plaster was the method of choice in 1942, but it is understood that the double-cuff has acquired popularity in 1943.

The Tobruk plaster has the advantages of providing extension and firm immobilisation, and complete limb covering. It is essential that this cast should be split, or else in some cases vessels will be compressed—even where there is no primary vascular injury—and cause gangrene of the toes.

The Tobruk plaster takes longer to put on, and requires greater experience in plaster technique, than the double-cuff plaster. The advantage of the latter is [illegible] it is very simple to apply. On the other hand it [illegible]bly gives less firm immobilisation, and may cause [illegible]re at the ankle level to the extent of producing a sore, because the foot may swell. Neglect to support the foot by a foot-piece causes foot-drop and a pressure sore over the tendo Achillis. A partial combination of the two methods is shown in fig. 5.

In using the double-cuff, no attempt is made to employ the plaster-of-paris for any purpose other than fixation.

SUMMARY

1. Standard splinting for the fractured femur requires modification when patients have to be evacuated over long distances.

2. Two useful methods of combining plaster splinting with a Thomas splint are described.

The photographs were taken at St. Nicholas Hospital, Pyrford, by the courtesy of Brigadier W. R. Bristow, and I wish to thank him and his staff for their help. The greater part of the article is an elaboration of part of a booklet, *The Treatment of Gunshot Wounds of Bones and Joints, &c.*, written by me and printed and circulated by GHQ, Middle East Forces, in August, 1942.

WATER-PITRESSIN TEST
IN THE DIAGNOSIS OF EPILEPSY

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THE diagnosis of epilepsy both in civil and military practice must usually be made on history alone, for when fits are infrequent they are rarely witnessed by a competent observer. In civil life the diagnosis is seldom a matter of urgency but in the Army it must be made quickly, because epileptics are unsuitable for military service. Further, "feigned epilepsy" has been used as a means of evading military service (Ironside 1940). The admission of cases to hospital for prolonged observation should find little or no place in the medical services of an army at war, and any rapid and reliable method of establishing the presence of epilepsy must be of considerable value. In some cases the electro-encephalogram provides such a test, but it is not always available nor are its results always conclusive; hyperventilation, small doses of 'Cardiazol' (leptazol) and the ethylchloride spray test have on the whole proved unreliable. The water-pitressin test having been found more satisfactory by most workers, we have used it in 96 cases, including 20 controls.

HISTORY OF THE TEST

A relation between fluid balance and the occurrence of convulsions has long been suspected.

Rowntree (1926) reviewed the literature and established that convulsions could be produced in animals by the forced ingestion of water. He found that the symptoms of water intoxication could be prevented or cured by intravenous saline.

McQuarrie (1929) studied the effect of alterations in diet, of fluid intake, and of giving 'Pituitrin' with both low and high water intake, on the frequency of epileptic seizures in children, and later he and Peeler (1931) used ingestion of water with 'Pitressin' to prevent the accompanying diuresis. Water and pitressin were given over periods of 12–48 hours at 4-hourly intervals, producing an increase in weight of from 2–5%: fits occurred in all but one of a series of 40 mild epileptics, but in none of a series of controls; petit mal was induced in one case, and the frequency of minor attacks increased in another. The cerebrospinal fluid pressure did not rise above 200 mm. during the test. Administration of sodium chloride inhibited the production of fits, a greater increase in body-weight and a longer period of hydration being necessary before a fit occurred. From these and other considerations they suggested that it was the disturbance of ionic balance to which the epileptic was more sensitive than normal, rather than the hydration itself, and put forward a tentative suggestion that the defect in epilepsy might be an abnormality of the semipermeable membrane of the brain cells.

Jacobsen (1934) using a similar test produced fits in all but 2 of a series of 40 epileptic children. Daneo (1934) had positive results in 41% of 63 proved epileptics, while Stefanacci (1934) in 42 cases had positive results in 10%. Clegg and

Thorpe (1935) hydrated a small series of cases for three days, on the third day giving 3 doses of 0·5 c.cm. pitressin at 4-hourly intervals; 3 out of 4 cases of idiopathic epilepsy, 2 of 5 traumatic cases and only 1 of 7 cases with "atypical attacks" had fits.

Janz (1937 [illegible] water-pitressin as [illegible] tilation produced at [illegible] water-pitressin gav [illegible] ileptics and negative results in 40 non-epileptics. The patients were given an alkaline diet with 9 grammes of sodium bicarbonate daily for three days, and on the fourth day were given 1 c.cm. 'Tonephin' and 3 to 4 litres of water to be drunk in 10–30 minutes; further water and injections of tonephin up to a total of 6 were given in the next 12 hours, the amount depending on how the initial weight gain was maintained. Fits occurred on an average from 5 to 8 hours after the hydration was commenced.

Roth (1937) giving as much water as possible during a one-day test period, and 3 doses of 1 c.cm. tonephin at 4-hourly intervals, produced fits in 45% of a group consisting of 28 old genuine epileptics and 1 case of traumatic epilepsy, while in 51 thought to be epilepsy, but whose fits were very infrequent, only 10% were positive. Gibson (1937) gave 300 c.cm. of water every 2 hours and pitressin at 4-hourly intervals for 24 hours, over-breathing being carried out for one minute after [illegible] epileptics and in none of 12 controls; it is noteworthy that *the latter included 5 mental defectives who had all had fits* with only 2 to 3 c.cm. of leptazol.

Janzen and Homeyer (1939), giving 3 or 4 doses of 1 c.cm. 'Pituglandol' with 1 litre of water every three hours, produced no fits in 43 healthy men with a "suspicion of epilepsy," while of 39 patients with idiopathic epilepsy 36% were positive, as were 22% of 23 cases with symptomatic epilepsy. Ziskind and others (1939) made a careful study of the effect of a large, rapid intake of fluid in 34 epileptics and 9 cases of neurosis; they found that on giving 1 litre of water per half hour to a total of 7 litres, there were fits in 11 of the epileptics and in none of the neurotics. All the fits occurred within 9 hours.

Wachter (1939) tested 15 epileptic children, producing major fits in 7 and clonic twitchings in 2; 1 case of spasmophilia gave a negative result. Viau (1930) using a similar technique had positives in 10 out of 12 epileptic children. DeLorenzo (1940), following McQuarrie's technique, produced fits in 8 out of 10 cases of idiopathic epilepsy in children, but no fits in 5 cases of epilepsy due to various causes, 1 of traumatic epilepsy, 1 of petit mal, nor in 7 normal controls. Blyth (1943) tested 87 military patients; they were encouraged to drink as much water as possible for 48 hours, a gain in weight of 2% usually being obtained, while on the third day 300 c.cm. of water and pitressin (0·25 c.cm. for the first injection followed by 0·5 c.cm.) were given every two hours to a total of 10 injections. His cases were divided into those in whom idiopathic epilepsy was suspected from the history but the existence of which was denied by the patient, and those where epilepsy was claimed by the patient in the absence of supporting evidence: 45 out of 49 cases in the first group were positive as were 3 out of 38 in the second group.

TECHNIQUE

It was necessary for us to find a technique which was brief and required as little skilled observation as possible. After preliminary trials in which up to 10 doses, all of 0·5 c.cm. pituitrin, were used, the following routine was considered satisfactory, as likely to give a maximum *chance of inducing a convulsion in an epileptic with* minimal risk and discomfort to the patient.

The posterior lobe of the pituitary produces two clinically important principles—namely, vasopressin, which constricts arterioles, raises the blood-pressure, antagonises insulin and has an antidiuretic action, and oxytocin, which stimulates uterine muscle. 'Pitressin' and 'Pituitrin' both contain vasopressin: 1 c.cm. of pitressin contains 20 pressor units, and 1 c.cm. of pituitrin contains 10 pressor units. Pituitrin, given subcutaneously, was used in our cases, being more readily obtainable than pitressin.

The patient was kept in [illegible] out the test and for 24 ho [illegible] was given hourly from 7 [illegible] tinued, usually after 11 pints. Pituitrin was given hourly from 10 AM, the doses being 0·2, 0·3, 0·4, 0·5 c.cm., followed by 4 doses of 0·5 c.cm.—a total of 8 injections. The patient was weighed, after emptying his bladder at 6.55 AM, at 3-hourly intervals for 12 hours, and again at the end of 24 hours. (The [illegible] one in which the patient can [illegible] blood-pressure was measured [illegible] frequently if there were marked fluctuations. Fluid given included water, lemonade, milk, and 'Ovaltine.' All fluid intake and output, including urine and vomitus, was measured from 7 PM on the previous day until the *morning following the test; this gave a further check on* water retention apart from the weight change. The test was stopped at once if a fit occurred and 1 grain of phenobarbitone was given by mouth. It was also stopped if there was severe and distressing vomiting, abdominal discomfort or severe and persistent headache. Fits usually occurred from 5 PM onwards.

As commercial preparations of pituitrin vary in histamine content, and to some extent in potency, the doses cannot be rigid. The doses were reduced if the patient's general condition, as judged by vomiting, pallor, rising blood-pressure, mental disturbance and abdominal discomfort, seemed to indicate it. Alternatively if the general condition was good, and amounts of urine of 8 ounces or more were passed in the hours from 2 PM onwards, the subsequent dose of pituitrin was 0·5 c.cm. and on occasion the test was continued for a further two hours. The total pituitrin dose in our series varied from 1·3 to 5·0 c.cm. With this technique, water was being *given at the rate of 9 c.cm. per kg. body-weight per hour* in the case of a 10-stone man.

MATERIAL

We have used the test in three types of case, the subjects studied being males between the ages of 19 and 38.

Group 1 consisted of undoubted epileptics, 44 in number. In these the diagnosis was based on such features as the type of aura, sudden loss of consciousness, injury during the attack (including biting of the lips or tongue), incontinence, subsequent headache and drowsiness, nocturnal attacks and the observation by an untrained observer of such features as cyanosis or of the eyes remaining open. In some cases an attack had been observed by a qualified person. We did not consider the so-called epileptic personality to be of diagnostic value in the mild type of epileptic under consideration; moreover, epilepsy not infrequently occurs in those with a hysterical personality, some cases showing both epileptic and hysterical fits.

Group 2 consisted of 32 cases in whom the above criteria were not satisfied sufficiently to justify a certain diagnosis, and in many of whom the presence of hysterical features in the past history complicated the picture. This is the group in which the test finds its greatest value.

Both these groups consisted of essentially mild epileptics; the majority were only having attacks at intervals of more than 2–3 months without sedation and some had only had one attack. All had been passed as fit for military service.

Group 3 consisted of 20 cases with hysterical personality; their attacks in no way conformed to the criteria of epilepsy and were considered to be psychogenic.

RESULTS

No fatality has been reported with this test, but we have heard of one fatal case, that of an elderly institutionalised epileptic in whom the hydration was pursued for 72 hours. Faurbye (1938) reported 3 cases in which prolonged mental confusion, in one case for over a month, followed seizures evoked by the test; a fourth case with recurring schizophrenic episodes, had an attack exceeding in severity and duration any which he had previously suffered. In our 96 patients the response to the test gave rise to anxiety in only 2.

In one, a man of poor physique though with no evidence of organic disease, after a seizure provoked by only 8 pints of fluid and 1·3 c.cm. pituitrin, the patient became dyspnœic, cyanosed and almost pulseless for about 2 minutes; he responded rapidly to warmth and 'Coramine' (nikethamide). Two and a half hours before the seizure his systolic blood-pressure had fallen from 130 to 100 mm. Hg although there was no change in the diastolic pressure and the drop had recovered an hour later. This collapse was unexplained.

TABLE I—RESULTS OF TEST

Group	Total	Positive	Negative
1. Epilepsy	44	17 (39%)	27 (61%)
2. Doubtful	32	12 (38%)	20 (62%)
3. Controls	20	0 (0%)	20 (100%)

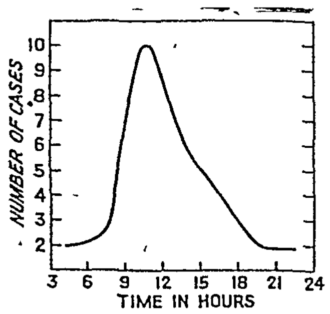
In another, following a grand mal attack at 6 PM, having had his last dose of pituitrin at 5 PM, vomiting which had occurred during the test persisted and increased; during the next 12 hours he had three more fits and was not fully conscious between the attacks; he subsequently had amnesia for a period of 14 hours, from 6 PM to 8 AM. This case was unusual in that diuresis, which usually begins during the evening of the test and reaches a maximum about 2 AM, was absent; he passed no urine from 5 PM to 9 AM the next day. It happened that no phenobarbitone for intramuscular use was available, and that given by mouth was not retained. However, 24 hours later he had no subjective complaints and there were no further fits for five days.

TABLE II—RESULTS IN RELATION TO TYPE OF EPILEPSY

Type	Group 1—Epilepsy		Group 2—Doubtful	
	Total	Positive	Total	Positive
Idiopathic (major)	35	14	29	12
Traumatic	7	3	3	0
Psychomotor	1	0	0	0
Petit mal	1	0	0	0

Apart from these, no alarming symptoms occurred. All the patients had more or less pallor, varying in time of onset and depth. About 90% had headache, half complained of abdominal fullness and nausea, while more than a quarter actually vomited. Colic developed in a few cases but was rare after we began to give initial small doses of pituitrin, rather than an original dose of 0·5 c.cm. Blood-pressure showed no constant change, though a slight increase of pulse pressure was common; any pronounced change was considered an indication for reducing dosage of pituitrin or omitting a dose. Mild diarrhœa on the day after the test was not unusal. In practice the only common indication for abandoning the test was lack of coöperation from the patient. The general understanding and behaviour of sisters and orderlies was important, and as they became more familiar with the test the number abandoned became less.

The results obtained are set out in table I. Table II gives a further analysis of the type of case, the diagnosis of traumatic epilepsy being, of course, uncertain but suggested by the onset of epilepsy within 18 months of a moderate or severe head injury, in several cases after the age of 25. It will be seen that the results were the same in groups 1 and 2.



Fits occurred from 5 to 24 hours after the onset of the test. Their frequency at different periods after the start is shown in the figure; in the case of patients who had more than one fit the first is shown. It will be seen that the majority of cases had attacks from 9 to 15 hours after the start of the test. Five had two fits, one had four, and one five at intervals from a quarter to three hours. The maximum gain in weight varied, the average being 3·5% of the original body-weight. About 90% of cases gained between 2 and 5%, the highest being 8·5%. Two positive cases showed no weight gain at the times at which they were weighed. There was no significant difference between the weight gains in groups 1, 2 and 3, nor between the positives and negatives in groups 1 and 2. Two patients in group 3 and one in group 2 had hysterical fits. The test was abandoned in 3 cases in group 1, 1 in group 2, and 6 in group 3. In group this was due to lack of coöperation in 4 hysterical fit in one and a severe headache in another. In group 2 the case abandoned had a hysterical fit, while in group 1 one had marked vomiting and one became drowsy after 5 injections of pituitrin, but rapidly recovered on cessation of the test; the third failed to coöperate. In spite of the high percentage of tests discontinued in group 3, this group is still comparable, for in no case was the pituitrin and water dosage less than that required to produce a fit in two positive cases in the other groups.

DISCUSSION

The results obtained by previous workers, and by us, are summarised in table III. Positive results have been reported in 10% to 100% of epileptic subjects; but, omitting children, most investigations have induced fits in about 40% of epileptics tested; Hagenmeyer and Langelüddeke (1939), whose series consisted of only 10 cases, and Blyth (1943) are exceptions to this. No average of positive results can be presented, for the different types of cases used by various workers are not comparable. It appears that fits are easier to produce in children, and several authors agree that it is easier to produce a seizure in the more severe epileptics, in whom of course the possibility of a spontaneous fit occurring during the test period is greater. It seems almost certain, from the considerable number of negative results in controls, that it is not possible to produce a fit in non-epileptic subjects by this test.

It will be seen that the technique for producing hydration has varied a good deal. Opinion as to the advisability of a preliminary period of hydration is divided. McQuarrie and Peeler (1931) state that it is easier to produce a fit by hydration followed by a period of dehydration, while other workers have hydrated the patient for two days before giving the pitressin. A more considerable gain in weight can be produced in children than adults, Viau (1939) obtaining a 20% increase in some cases. From 2 to 5% gain in weight has been obtained in adults by most workers who mention this, using widely varying techniques.

TABLE III—RECORDED RESULTS

Authors	Total	Group 1 Epilepsy		Group 2 Doubtful		Group 3 Controls		Remarks
		Total	Positive	Total	Positive	Total	Positive	
McQuarrie & Peeler (1931)	40	40	% 98	—	% —	Uns.	% 0	Children. Mild epilepsy
Jacobsen (1934)	40	40	95	—	—	—	—	Children
Daneo (1934)	63	63	41	—	—	—	—	
Stefanacci (1934)	42	42	10	—	—	—	—	
Clegg & Thorpe (1935)	23	16	75	—	—	7	0	Institutional cases
Stubbe Teglbjaerg (1935)	9	9	55	—	—	—	—	2 positives of 5 traumatic epilepsy; 1 pos. of 7 atypical cases
Janz (1937)	109	69	42	—	—	40	0	
Gibson (1937)	17	—	—	11	55	6	0	3 negatives, later confirmed epilepsy
Roth (1937)	80	(a) 29 (b) 51	45 10	— —	— —	— —	— —	(a) Chronic (b) Infrequent attacks
Hagenmeyer & Langelüddeke (1939)	22	10	100	—	—	12	0	
Janzen & Homeyer (1939)	105	(a) 39 (b) 23	36 22	— —	— —	43 —	0 —	(a) Idiopathic (b) Symptomatic
Wachter (1939)	16	(a) 12	66	—	—	1	0	(a) Idiopathic (children)
		(b) 3	33	—	—	—	—	(b) Symptomatic
Ziskind & Others (1939)	43	34	32	—	—	9	0	
Viau (1939)	12	12	83	—	—	—	—	Children
DeLorenzo (1940)	34	(a) 10 (b) 7	80 0	— —	— —	9 —	0 —	Children: (a) Idiopathic (b) Symptomatic
Blyth (1943)	87	49	92	38	18	—	—	Adults
Present series	96	44	39	32	38	20	0	Adult males
Total ..	838	602	..	81	..	155	0	—

Uns. = Unstated.

It has been shown that pitressin alone will not produce a fit in an epileptic. The fact that salt administration hinders the occurrence of a fit during the test is of interest in relation to the clinical observation that some epileptics take an abnormally large quantity of salt with their food. It is well known that a fit can be precipitated by heavy beer-drinking, and epileptics should always be warned against taking large quantities of fluid.

We have not seen a minor epileptic attack induced by this test, but only one of our cases was subject to petit mal; McQuarrie and Peeler (1931) report one case in which petit mal was induced and another in which the frequency of seizures was increased. Blyth (1943) mentions a minor attack as an indication of a positive test, but he does not say how many times he has seen one. No other workers have reported this, nor have psychomotor attacks been mentioned, but Faurbye (1938) reports a case in which following a test the patient began to have "absences" which persisted, and who had not previously suffered from this form of epilepsy. It was hoped that some distinction might be drawn between idiopathic and traumatic epilepsy (in which the mechanism of production of a fit is presumably somewhat different) in their reaction to the test, but this hope was not realised.

[illegible], since in about 40% of [illegible] may be established at [illegible] under the conditions of military practice, both from the point of view of the Army and the man; a day's unpleasantness is more than offset for the patient by the avoidance of weeks of uncertainty, while for the Army the value of rapid disposal is obvious. The test might also find useful application in certain medicolegal cases.

We would stress the inadvisability of carrying out the test on any but young and healthy subjects, and the importance of careful and continuous observation, with particular reference to general condition and blood-pressure. Under these conditions we believe the test to be free from risk. An interesting piece of research in the future will be electro-encephalographic studies before, during and after the test.

SUMMARY

1. For the purpose of diagnosis, fits can often be induced in epileptics by giving large quantities of fluid by mouth, together with injections of pituitary extract containing vasopressin ('Pitressin').
2. This procedure has never yet induced a fit in a person who was not an epileptic.
3. Such a test is valuable in the Services, where rapid recognition and disposal of epileptics is required.
4. Its usefulness is demonstrated by the results of investigation of 96 cases. Of [illegible] had a fit during the test. Of [illegible] 12 (38%) had a fit. Of 20 [illegible] personality, none had fits.
5. The test appears to be free from risk provided the patients are kept under close observation, are young and (apart from epilepsy) are healthy.

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[illegible] 106, 987.
[illegible] 755.
[illegible] nerv.

HEALTH IN YUGOSLAVIA.—At 5 PM on Thursday, Nov. 4, Dr. Milosh Sekulic, late senior physician of Belgrade, will speak on this subject at the Livingstone Hall, Westminster, S.W.1. Major-General P. H. Mitchiner will be in the chair.

INHIBITION OF PENICILLIN IN ROUTINE CULTURE MEDIA

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THE bacteriological investigation of wounds treated with locally applied penicillin may be complicated by the presence in wound swabs of inhibitory concentrations of the drug. The complication is usually avoided by taking bacteriological samples after the disappearance of the drug, which is rapidly absorbed from wound surfaces. In some cases, however, the drug may be applied more or less continuously, in the form of a strong preparation or a paste, and a means of destroying the penicillin taken up on the wound swab is desirable. Inactivation of penicillin by heat or chemicals—e.g., strong sulphuric acid—is obviously inapplicable, so advantage was taken of the observations of Abraham and Chain[1] to prepare a penicillin inactivator suitable for use with routine culture media. These workers noted that certain bacteria destroyed penicillin. The active agent, which they named penicillinase, was present in a number of saprophytic and commensal bacteria. Among these were described two gram-negative bacilli; in one, a contaminant of penicillin cultures, the penicillinase was present in the culture fluid; in the other, a strain of *Bact. coli*, the penicillinase was liberated after crushing the bacterial cells. Abraham and others[2] also noted that the contamination of penicillin cultures with air bacteria sometimes resulted in the destruction of the penicillin.

ISOLATION OF AN ACTIVE PENICILLINASE PRODUCER

Various bacteria, including air micrococci, were tested first for their ability to grow in 1 in 5000 penicillin broth. The penicillin-insensitive strains revealed by this means were then tested by the Oxford plate technique[2] for their powers of inhibiting the action of penicillin, appropriate controls of uninoculated penicillin broth being included. Stable preparations of all presumptive penicillinase producers were made as follows. *Twenty-four hour plate cultures were washed off in a* minimum of distilled water, and the suspensions precipitated with seven volumes of acetone. The precipitate, after standing for an hour, was treated for 1–2 hours with fresh acetone, and then with two changes of ether. The final ether-treated suspension was spun, and the deposit dried quickly in vacuo. The resulting fine white bacterial powder was stored in a sterile tube, and samples tested for sterility.

[illegible] the powder, suspended [illegible] to tubes containing 10 [illegible], each tube inoculated with 0·02 ml. of an 18-hour broth culture of *Staph. aureus*, and the minimum inhibiting dose of powder noted after overnight incubation. The tube readings were confirmed by plating. Table I shows the results with an air micrococcus and a number of gram-negative bacilli. [illegible] high penicillinase activity prompted the investigation of the other gram-negative bacilli. The paracolon, however, proved to be the most active of all strains tested.

The paracolon bacillus is a motile gram-negative rod producing acid and gas from glucose, mannite, lactose (late) and salicin (late), but not from sucrose. The Voges-Proskauer reaction is negative and the MR reaction positive. Indol positive. Gelatin is not liquefied.

It actively destroys penicillin, for Seitz filtrates of overnight cultures in broth which had contained 5 units of penicillin per ml. contained no penicillin. Similar tests of the *Bact. coli*, *Bact. aerogenes*, and the air micrococcus showed no such complete destruction. The penicillinase is in part extracellular, for 24-hour culture filtrates were active; in one test 10 units of penicillin was destroyed by 0·5 ml. of filtrate. An attempt was

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[1] Abraham, E. P. and Chain, E. *Nature, Lond.* 1940, 146, 837.
[2] Abraham, E. P., Chain, E., Fletcher, C. M., Gardner, A. D., Heatley, N. G. and Jennings, M. A. *Lancet*, 1941, ii, 177.

TABLE I—PENICILLINASE ACTIVITY OF VARIOUS BACTERIA

Organism	Growth in 1/5000 penicillin broth	Result of Oxford plate test	Weight of dried culture required to destroy 10 units of penicillin (mg.)
Paracolon 7 strains)	+	No inhibition	0·05
Bact. coli (2 strains)	+	,,	2·0
Bact. aerogenes	+	,,	0·5
Bact. typhosum	−	..	..
Bact. typhi-murium	+	Inhibition	..
Bact. flexneri	+	,,	..
Ps. pyocyanea	+	,,	..
Proteus vulgaris	+	,,	..
Air micrococcus	+	No inhibition	0·5

made to prove the destruction of the penicillin by extraction with amyl acetate from mixtures of penicillin solution and dried culture which had been incubated together overnight. Parallel control experiments were performed on penicillin solution alone and on paracolon suspension alone. The amyl acetate extracts were shaken up with water, the watery fluids added to broth and tested against *Staph. aureus*. Penicillin was present in the extract of penicillin solution, but not in the other two extracts. Amyl acetate failed to extract penicillinase in demonstrable quantities.

Living cultures, culture filtrates and dried preparations of the paracolon appear to destroy penicillin. All dried preparations of the paracolon had about the same activity—equivalent to 10 units of penicillin in 0·05 mg. Since the average yield of dried culture was 13 mg. per overnight plate, the growth from six plates provides enough dried culture to destroy 16,000 units of penicillin. The powder has so far kept for five months without deterioration. Suspensions of the dried powder in water, held at room temperature and at 2° C., had lost no activity after 5 weeks.

TABLE II—PENICILLIN INHIBITION IN COOKED MEAT MEDIUM (CMM)

No. of wounds swabbed = 16	No. of swabs showing growth		
	Before penicillin	After penicillin	
	CMM	CMM	CMM + penicillinase
	16	1*	16

* Growth of the penicillinase-producing paracolon.

Enzyme production by bacteria is in some cases enhanced by growth of the cell in the presence of the substrate, and accordingly the paracolon was subcultured twice daily for a week in 1 in 500 penicillin broth. A control series of subcultures was made in plain broth, and dried preparations of the two resulting strains made as before. No enhancement had occurred; 0·05 mg. amounts of both powders were equivalent to 10 units of penicillin.

TESTS WITH CULTURES AND SWABS

A cooked meat culture tube was inoculated with a wound swab taken before the application of penicillin; penicillin was then applied to the wound, and two swabs taken; one was inoculated into plain cooked meat medium, the other into cooked meat medium containing 1 mg. of dried paracolon. The tubes were subcultured on blood agar after 18 and 36 hours' incubation. Sixteen wounds were tested, of which fifteen contained *Staph. aureus* or *Strep. pyogenes* or both organisms, and one the penicillinase-producing paracolon. The efficacy of the paracolon preparation is shown in table II.

The powder may be incorporated in blood-agar plates. Preliminary tests showed that exposure of suspensions of the powder for 30 minutes at 50° C.—i.e., the conditions obtaining in molten agar before pouring the plate—had no effect on the penicillinase activity. In practice, 1 [illegible] of dried culture in 1 ml. of sterile distilled water is added to 70 ml. melted agar at 50° C. and mixed well, 3·5 ml. horse blood is added, and 10 plates are poured at once. A number of these plates and equal numbers of plain blood-agar plates were flooded with a solution of penicillin, each plate receiving a total of 50 units. After drying at 37° C. the two sets were inoculated with freshly isolated strains of *Strep. pyogenes* and *Staph. aureus*. The results of overnight incubation are shown in the first part of table III. For occasional use, the powder may be rapidly and economically applied in suspension to the surface of routine blood-agar plates; 0·1 ml. of a 1% suspension of the dried culture is spread evenly over the surface, and the plates dried at 37° C. A comparison of treated and untreated plates is shown in the second part of table III; the method is as successful as incorporation in the agar.

TABLE III—PENICILLIN INHIBITION ON SOLID MEDIA

(a) *Penicillinase incorporated in medium*

Organism	No. of strains	No. showing growth	
		Penicillin blood agar	Penicillin blood agar + penicillinase
Staph. aureus	25	0	25
Strep. pyogenes	21	0	21
(b) *Penicillinase applied to surface*			
Staph. aureus	17	0	17
Strep. pyogenes	17	0	17
C. diphtheriæ (mitis)	1	0	1

A comparison of plain blood-agar plates, plates containing the dried culture and plates with a surface application of the dried culture was made with actual wound swabs taken immediately before and after the application of penicillin. The results, shown in table IV, clearly demonstrate the efficacy of the paracolon preparation with specimens containing relatively large quantities of penicillin. The amount of paracolon powder per plate—1 mg.—was sufficient to destroy 200 units of the drug. This should be well in excess of the amount needed in routine work, but it could be adjusted according to the amount of penicillin likely to be present in the material to be examined.

TABLE IV—PENICILLIN INHIBITION IN PLATING OF ROUTINE WOUND SWABS

No.	Before penicillin	After penicillin	
	Routine media	Routine media	Penicillinase media
1	+ + + *Staph. aureus*	Sterile	+ + + *Staph. aureus*
2	+ + + *Staph. aureus*	,,	+ + + *Staph. aureus*
3	+ *Staph. aureus*	,,	+ *Staph. aureus*
4	+ + *Staph. aureus*	,,	+ + *Staph. aureus*
5	+ *Strep. pyogenes*	,,	+ *Strep. pyogenes*
6	+ + + *Staph. aureus*	,,	+ + + *Staph. aureus*
7	+ + *Staph. aureus* + + + Diphtheroids	,,	+ + *Staph. aureus* + + + Diphtheroids
8	+ + + *Staph. aureus*	,,	+ + + *Staph. aureus*
9	+ + + *Staph. aureus* + + *Strep. pyogenes*	,,	+ + + *Staph. aureus* + + *Strep. pyogenes*
10	+ + + *Staph. aureus*	,,	+ + + *Staph. aureus*

Penicillinase in the form of a dried bacterial powder could be advantageously employed in blood-culture from patients with circulating penicillin, and in sterility tests of penicillin preparations intended for clinical use; where the unitage of the preparation is known, precise neutralising quantities of a standardised bacterial powder could be added as a routine to the test culture media.

The enzymatic nature of the inhibitor has yet to be proved. Though investigations in progress suggest that an enzyme is concerned, in this paper the designation of the active agent in the paracolon cultures by the term "penicillinase" must be regarded as tentative only.

SUMMARY

On routine bacteriological media penicillin-sensitive bacteria will not grow from samples of pathological material containing inhibitory concentrations of the drug. This inhibition may be readily overcome by the addition of a preparation of penicillinase to the media.

Stable preparations of the enzyme for routine use have been made by the acetone-drying of 24-hour plate cultures of a paracolon bacillus of high penicillinase activity, and have been shown to work satisfactorily when tested on a small series of swabs taken from wounds being treated by local application of penicillin.

The penicillinase preparation could also be employed in sterility tests of penicillin issued for clinical use.

I am indebted to the Sir William Dunn School of Pathology, Oxford, for samples of penicillin.

INTRA-ARTERIAL INJECTION OF PENTOTHAL

A WARNING

R. R. MACINTOSH
DM OXFD, FRCSE, DA

P. S. A. HEYWORTH
MA CAMB, MRCS, DA

THE dangers of injecting 'Pentothal Sodium' into an artery are not yet recognised. Though the result is sometimes serious, the risk is remote and need not deter anyone from using pentothal except possibly where no veins are visible. An artery may be injected inadvertently when it is superficial. Gray[1] points out that an aberrant ulnar artery may run "between the fascia and the skin," and in these cases "there is some danger of its being wounded when the median cubital vein is opened for the purpose of transfusion of blood or injecting saline solutions." Thus Van der Post[2] reported an injection [illegible]

An artery may be entered, too, when searching for a vein in the anticubital fossa of a plump forearm. The following two cases, one at a civilian and one at a Service hospital, illustrate the effects.

CASE-RECORDS

CASE 1.—Two years ago one of us (R. R. M.) induced anæsthesia with pentothal sodium in a series of children for tonsillectomy. An hour after induction with 1·5 c.cm. of a 10% solution, a boy, aged 5, complained bitterly of pain, not in the throat but in the hand on the side of injection. The hand and the distal part of the forearm were blanched and the radial artery was not palpable. An hour later the colour of the arm improved and the child went to sleep. It was thought that the radial artery was then palpable. Two days later the child was discharged. He *subsequently used* the arm normally, but on the eighth day after the injection he ran from the garden where he was playing screaming with pain in the hand. He was brought to hospital, where the following notes were made: "Hand ischæmic, cold, nails blue. Strong pulsation along the brachial artery, but palpation stops in middle of elbow; no *radial* pulse." *Two days later an inch* [illegible] weeks later amputation was performed through the forearm.

At the time it was considered that the injection had been given inadvertently either *into the artery* or in its vicinity. To study the effect of intra-arterial injection, Mr. S. F. Suffolk injected pentothal into the iliac arteries of two lightly anæsthetised cats. Into the control side saline was injected without response, but injection of 0·75 c.cm. of 10% solution of pentothal produced muscular contraction *in all four limbs which persisted for* about 30 seconds, by which time the cat was deeply anæsthetised. One cat was killed twenty-four hours afterwards, when nothing abnormal was found. The second cat walked normally thirty-six hours after the injection.

CASE 2.—(P. S. H.).—A healthy young man was operated on for varicose veins at a *Service hospital. A rubber band* was applied to the upper arm and a prominent vessel of the upper third of the ulnar aspect of the forearm was selected for injection. The needle was inserted, the rubber band released, and 5 c.cm. of a 10% solution of pentothal injected rapidly. The patient writhed in agony, gasping that he felt as if boiling water was being poured over his hand and that flames were shooting from his fingers. This continued for three-quarters of a minute, when the gas mask was applied at the time when he appeared to be losing consciousness. During the operation the injected arm was examined. There was no extravasation of fluid round the vessel, but it was swollen and hard, completely thrombosed distally for the 4 inches of its superficial course down the forearm; 15 minutes [illegible] affected fingers about three-quarters of an hour after the injection. Œdema of the whole hand developed during the night. This gradually subsided and in 10 days the patient was symptomless but remained with a thrombosed aberrant ulnar artery. On examination of the other arm it was found *that an aberrant ulnar artery existed there, the twin of the* vessel injected. Pulsation here was palpable until a pressure of 105 mm. Hg was reached on the sphygmomanometer. When the pulsations were occluded the vessel looked and felt exactly like a vein. It is worthy of note that compression of the patient's upper arm to make the vein prominent, *either by an assistant's hand or by a rubber band, frequently* obliterates arterial pulsation.

An agonising burning pain down the forearm and hand follows immediately the injection of pentothal into an artery. Lundy,[3] giving 2½% pentothal, reports two cases in which the injection was stopped when the needle was found to be in an artery because the patient complained of a "burning sensation in his hand"; no untoward effects followed in either case. Lees[4] gave 4 c.cm. of a 5% solution, on which the patient complained of a severe burning pain "as if he had plunged his hand into the fire." This injection was probably intra-arterial, though Lees attributes the effects to idiosyncrasy.

There are two ways of guarding against the ill effects of penetrating an artery. Observe the colour of the aspirated blood; the crimson of arterial blood is unmistakeable. Then when beginning the injection give a *minute quantity of pentothal and wait five seconds for* any untoward effects before continuing the injection.

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[1] Gray's Anatomy, London, 1938, p. 753.
[2] Van der Post, C. W. H. *Anesth. & Analges.* 1942, 3, 58.
[3] Lundy, J. S. Clinical Anæsthesia, London, 1942, p. 547.
[4] Lees, J. *Lancet*, 1943, i, 759.

CONCENTRATION OF SULPHAPYRIDINE IN BILE

NANCY GOUGH, BSC EDIN
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PUBLISHED data on the concentration of sulphonamide drugs in the bile are inconclusive and contradictory. Thus Bettman and Spier (1930) stated that, whereas with a normally functioning gall-bladder the concentration of sulphanilamide was always greater in the bile than in the blood, the reverse was true with a non-functioning gall-bladder. Spink and others (1941) claimed that the concentration of sulphanilamide was always lower in the bile than in the blood, although [illegible] usually greater in the bile. [illegible] (1941), who used much [illegible] and sulphapyridine to be in [illegible] bile than in the blood. Barber and co-workers (1943), in experiments on rabbits, found that in contrast to a new drug, sulphacholazine, which reaches a high concentration in bile after intravenous injection, sulphanilamide and sulphapyridine were never present in the bile except in very small amounts.

The experiments reported in this paper were made with the object of assessing the possible value of sulphapyridine as a biliary antiseptic. Patients on whom an operation *for biliary fistula had been performed* were the subjects. Some days were allowed to elapse after the operation before specimens were obtained, with the object of minimising the effects of the anæsthesia on the liver. After a control specimen of bile had been collected an initial dose of 2 g. of sulphapyridine *was given by mouth, and thereafter a main-*

LEVEL OF SULPHAPYRIDINE IN BLOOD AND BILE (MG. PER 100 C.CM.) IN 8 PATIENTS WITH BILIARY FISTULA

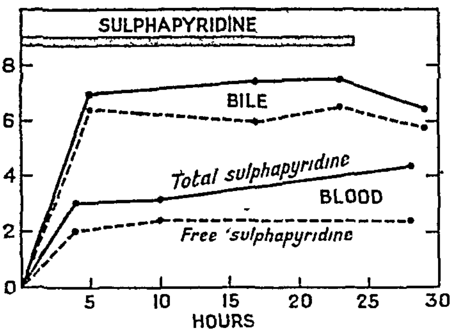
Case	Hours after initial dose	BLOOD		BILE	
		Free	Total	Free	Total
1	26	2 7	3 0	6 0	..
	32	4·0	4 7	15·5	..
2	15	..	..	6·4	6·6
	26	3·1	4 1	5·3	6 7
3	24	4·5	5 6	8 0	8·2
4	12	..	..	7·5	8·2
	26	3·1	3 6	9 2	10 4
5	3	2 5	2·8	5·1	5 9
	12	..	..	6·8	7 3
6	4	2 0	3·1	6 5	6 9
	30	2 2	4·8	5,7	6·2
7	24	3·1	3 8	12 2	13 0
8	24	2 2	2·7	9 0	11 5

In cases 1 and 2, sulphapyridine 2 g. was injected intramuscularly on two successive days.

In cases 3, 4, 5, 6, an initial dose of 2 g. sulphapyridine was given by mouth and thereafter 1 g. every four hours.

In cases 7, 8, specimens of blood and bile were taken at operation; 1 g. of sulphapyridine had been ingested every four hours for twenty-four hours before operation.

tenance dose of 1 g. every four hours. Specimens of bile were taken for analysis at intervals of one to six hours from the time of the initial dose, and blood about every six hours for two days or longer. The analyses were carried out according to the method of Marshall and Litchfield, and in the case of bile the pigments were removed by absorption on barium sulphate.



Level of sulphapyridine in blood and bile; initial dose of 2 g of the drug and thereafter 1 g every four hours

The findings are set out in the table. Of the eight cases studied all showed a higher maximal level in the bile than in the blood, usually about 6–8 mg. per 100 c.cm. in the bile when the blood concentration was about 3–4 mg. per 100 c.cm. In one case the bile sulphapyridine rose to 15 mg. per 100 c.cm. This was during the second day of the experiment. The drug had been given intramuscularly to avoid nausea and vomiting, and there was apparently considerable delay in absorption, as only traces were found in the bile and blood for twelve hours after the intramuscular injection.

A typical curve of the sulphapyridine concentration in the bile and blood is shown in the figure. In this case the biliary fistula had been made six days before the beginning of the investigation. The initial dose of 2 g. sulphapyridine was given by mouth at 11 AM, and thereafter 1 g. every four hours.

Two patients were given the above dose of sulphapyridine for twenty-four hours before cholecystectomy, and bile was taken from the common duct and gall-bladder at operation. In one case, the blood concentration was 4·5 mg. per 100 c.cm. (free) while the common-duct bile contained 8·0 mg. and the gall-bladder bile 11·7 mg. per 100 c.cm. free sulphapyridine. In the other case, the blood concentration was 3·1 mg. per 100 c.cm., while the common-duct bile contained 13·2 mg. free and the gall-bladder bile 12·9 mg. per 100 c.cm. free sulphapyridine (the surgeon reported that the patient had a non-functioning gall-bladder).

It may be concluded that despite the adverse effects on the secretory and concentrating power of the liver and gall-bladder which accompanied pathological changes in these organs, sulphapyridine may reach a concentration in the bile which, in blood, would be effective against certain organisms, and accordingly sulphapyridine appears to be worthy of clinical trial in infections of the biliary tract.

I wish to thank Prof. L. S. P. Davidson and Dr. C. P. Stewart, under whose direction this work was carried out, and the surgeons of the Royal Infirmary, particularly Prof. Learmonth, for their coöperation.

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OXFORD VAPORISER FOR ENDOTRACHEAL ANÆSTHESIA

WE regret that the wrong initials and qualifications were attached to this article as it appeared on p. 509 of our issue of Oct. 23. The correct wording is as follows:

M. RUSHTON, M B LEEDS
CAPTAIN RAMC; ANÆSTHETIST TO A MAXILLOFACIAL UNIT

Captain Rushton was then serving abroad and no proof was sent to him.

New Inventions

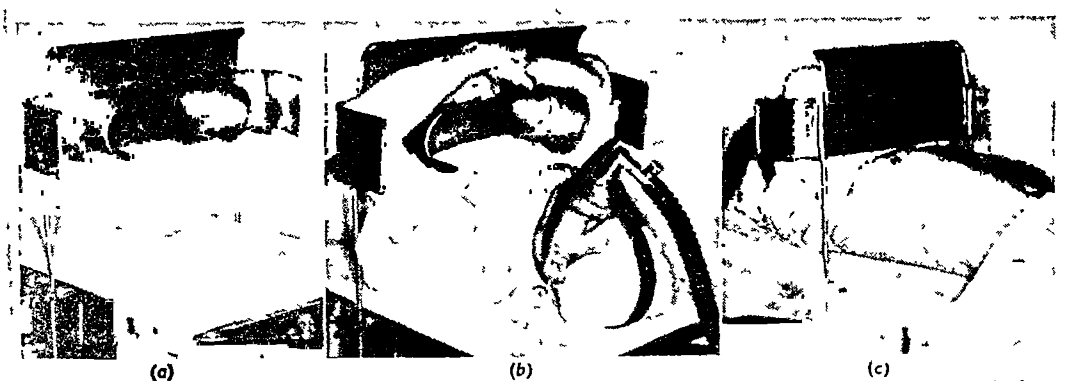
ARM-REST FOR PATIENTS AT OPERATION

IN order to facilitate the fixation of the arms at operation, a simply constructed and easily applied arm-rest has been devised. As far as I am aware, no similar appliance has hitherto been constructed.

The most useful function of the arm-rest lies in the ease with which the arms of the patient are controlled and excluded from the field of operation. It would appear that respiration is easier with the arms so placed, and when artificial respiration is called for, this appliance allows the surgeon to encircle the greater part of the chest-wall with his hands. The possibility of nerve palsy following malposition of the arms at operation is also eliminated.

The arm-rest consists of a transverse part, which slings the arms above the chest, supported by two vertical steel rods which fit into the standard goitre-screen sockets at the sides of the table (see figure). The appliance was constructed in a short space of time by the hospital master of works, the material used being stainless steel reinforced with beaded wire edging.

The patient is anæsthetised before the arm-rest is adjusted. Usually the arms lie comfortably across the arched horizontal piece, but a strap may be applied if necessary to prevent the limbs falling backwards. The appliance is particularly suitable for abdominal work and provides no hindrance to the highest epigastric procedure. It has been used consistently for the past 12 months.


(a) (b) (c)

(a) Arm-rest fitted to the operating table; (b) position of the arms with arm-rest adjusted; (c) view of arm-rest from the front.

G. RUSSELL THOMSON,
M B GLASG
Extra Dispensary Surgeon,
Western Infirmary, Glasgow.

Medical Societies

ROYAL SOCIETY OF MEDICINE

AT a meeting of the section of medicine on Oct. 26, Dr. **GEOFFREY EVANS** gave his presidential address on

Mental Health

Science, he said, has recognised the organic unity of the universe. Man has not come into the world but is of the world. Until recently we have thought in terms of a great gap between the animate and inanimate, but studies of viruses, catalysts and vitamins are now beginning to bridge it. Pattern can be seen everywhere —for example, in the chromosomes and the male and female sex hormones. There is a basic pattern in the structure of brain, and Jung has postulated a universal collective psyche—an intellectual pattern. His aim, Dr. Evans said, was to present a pattern of the human mind, and to make some suggestions about it.

All our behaviour is necessarily rooted in feeling, though we live under the delusion that we are acting rationally. The basic components of the human mind are the instincts of self-preservation, creation, and destruction; he suggested that study of the mind from these different aspects can be linked with the names of Adler, Freud and Stekel respectively. The ego-instinct, given so much weight by Adler, favours the survival of the individual; the sexual and creative instinct emphasised by Freud favours the survival of the race; and so far these two by a narrow margin have overcome the third great force, the force of destruction. With these three basic instincts must be included the herd instinct, which, Wilfred Trotter held, is added to the mind by experience and education and becomes as powerful in it as the others.

Together these four components form what Dr. Evans called the sensuous sphere—the core of the human mind. External to this sphere he postulated a supersensuous sphere. After many years of practice, he said, it had dawned on him that there was a general desire in people to do better and be better. To man belongs the pow[illegible] —a distinction [illegible] in the book of G[illegible] in his power to place things in time and space. A dog's idea of time is presumably limited by his lifetime, and his ideas of space by his immediate environment at any given moment. To man belongs the power of conceiving of time as a continuum, and of objects at a distance; he lives in a double world of space and time, and language allows him to express these concepts. Thus from the realm of the senses he enters the realm of imagination [illegible] the supersensuous sphere. A man's activities are an expression of his purpose in life. Mental ill health may derive from conflict in the sensuous sphere, as Freud demonstrated, but this is only one cause: commoner causes are lack of outlet, exhaustion and defeat. Even some conflicts in the sensuous core, he thinks, may best be resolved by acceptance or by sublimation in the supersensuous sphere, rather than by analysis at the sensuous level.

The instinct of self-preservation is strong in childhood, so that the child needs security and love; later the creative instinct becomes predominant and gives occasion for self-sacrifice. Yet this instinct too demands some security and even isolation. Self-interest may be partly creative, and may subserve the purposes of the race when it is directed to maintaining the home. It is not a sufficient purpose in itself, and the man who makes a fortune through self-interest is apt to devote part of his life or his money to others. Achievement does not, in any case, deserve too much emphasis: the effort to achieve is the thing. Restriction of creative activity is responsible for much mental ill health. A woman satisfies her creative impulse in bearing children, and is also often partly responsible for creative activity in a man. Before the war creative activity was at a discount; it was hindered by inherited wealth, early pensions, jobs which consisted in tending machines which did the creative work, and recreations which took the man to watch the skilled activity of others. War, he thinks, has shown the poverty of this; it has given opportunities to both creative and destructive impulses. After the war he believes that we must give more scope to the creative impulse. Most people need a regular supply of appreciation for their mental health and happiness; a man often gets it from a woman, doctors and nurses from patients. Where there is no opportunity for creative activity people must be given opportunities for service, with its reward in appreciation.

The destructive impulse is present in all of us, and of unrecognised strength. Generally speaking, it is stronger in men than in women and finds outlets in occupations such as those of the butcher, the gamekeeper or the timber-faller. It is not readily accepted as a fundamental impulse of the human mind because its satisfaction is often associated with pain, and because like other instincts it can be perverted. Yet in itself, Dr. Evans holds, it is natural and good, giving strength of character and combativeness to overcome evil. Uncontrolled destruction is alarming and must be met and overcome by greater force or even controlled by fear. This war is not, he thinks, a "sporadic outburst of barbarism"; it has its origin in the basic forces of the human mind.

Mental ill health may arise through conflict between the supersensuous and the sensuous spheres—as in the conflict between duty and desire. It may also spring from frustration at the supersensuous no less than at the sensuous level. Science, as might be expected, he said, provides the basis for religious thought, since intellect reigns—though not supreme—in the supersensuous sphere. Science recognises universal movement, an ordered change in the direction of elaboration, which is evolution. In all this there is pattern. Religion sees design in pattern, makes of scientific concepts a conceptual whole, and provides a purpose and meaning to life. Dr. Evans holds that the function of the mind is feeling. In the sensuous sphere this feeling finds expression in the four components of this sphere; in the supersensuous sphere it is religion that gives the feeling tone to the as yet highest activity of the human mind: that is, imagination and constructive thought.

Surgeon Captain **DESMOND CURRAN** spoke of his experience of mental ill health in the Navy over four years. He has been impressed by the degree to which men can adapt themselves to hard situations provided they have a worthy object before them and—he felt it fair to add—a fear of punishment behind. All Service medicine, he said, is social medicine. The doctor is continually asked: "Is this man fit for duty? If not, can he be made fit, and how soon?" He had been encouraged by the results of treating neurotic cases while keeping them at duty, and told of a naval surgeon consulted by a rating complaining of a "tight-band" headache. This man, who did not smoke, did not drink and whose sexual life was "below reproach," could not understand his symptoms. But on being told that his halo was getting too tight he stopped complaining. There is something to be said for reminding people that this is a vale of tears, and that to be uncomfortable or unhappy in it is only to be expected. Naval surgeons can recommend the type of job they consider suitable for a man returned to duty, but have no power to enforce it; and this, he thinks, is a good thing. Doctors are as fallible as other men, and we must not let our brains go to our heads, or suggest that we should run the world; we shouldn't do it very well, and it wouldn't be tolerated. After the war there will presumably be some attempt to fit people into jobs that suit them, but our claims to advise on voc[illegible] overrated. T[illegible] it is not for [illegible] may be able [illegible] The team sh[illegible] ledge of footb[illegible] tapped a man on the shoulder and said: "Come along, I know just the job for you." In the Navy, he finds, the less said about nerves the better; and probably the same is true in civil life. He thought we might get better results if a pension for neurosis, say, carried a compulsory rehabilitation course with it. But as an old-fashioned Liberal he would rather that we kept the neuroses than that we lost the liberalism.

SIR HENRY TIDY reminded the meeting that evolution was not an orderly business but a tangled growth. We did not derive from the monkey—our common ancestry was among the lemurs. Nature finished the monkey, just as she finished Neanderthal man; and Neanderthal man had failed. It was possible we might give place to quite a different type of man in time. Much of our progress, he thought, turned on our anatomy—on the facts that we had a hand that could grasp, and walked on two legs. The good of the herd is regarded differently in different quarters of the world and does not, he suggested, follow a pattern at all. He spoke, he said, as a hard-boiled materialist.

MEDICAL WOMEN'S FEDERATION

AT the annual general meeting of the London association of the federation on Oct. 23 Dr. MARGARET MACPHERSON spoke of the

Child in the Tuberculous Household

She began by pointing out the fact that the percentage of tuberculous infection (as judged by testing) among children in contact with closed cases is the same as that among children who have had no known contact with the disease; whereas the percentage among children who have been in contact with open cases is much higher. The aim must therefore be to keep children as far as possible from contact with open cases. In the home, the careless parent, or the old grandfather coughing by the fire, are disastrous contacts because of their intimacy with the child; and infected dust on the floor is perilously near to the mouth of the crawling baby. Yet it has been shown at Papworth that intelligent care can much reduce the danger, even from contact with open cases. She therefore laid emphasis on education—of the patient in the management of his disease, and of the public in its dangers and their avoidance. Of children under the age of 2 who die of tubercle, by far the most die of tuberculous meningitis, and she had been impressed by the complacence with which the death of a child—and sometimes two or three children—thought too precious to send away from home would be recounted by the parents. Part of this fatalism springs from the false notion, still generally current, that tubercle is hereditary, and she would like to see a campaign against that despairing belief. In the individual case direct preventive measures are sometimes possible. All contacts should be tested with tuberculin intradermally. An infant under 2 who gives a negative result should be removed from danger, preferably to the care of relations; residential homes have their own dangers for such young children. The test should be repeated within 6–8 weeks, since the child may have taken the infection but still be in the latent phase as far as skin sensitivity goes. In practice, parents are generally unwilling to face separation from their young children, but the situation is often solved by the patient leaving home for six months' sanatorium treatment; when he returns he is usually a closed instead of an open case, and he has learned the principles of managing his disease.

The infant who gives a positive result on testing must be treated as having a primary focus. He too should be taken out of range of repeated doses of infection and placed in favourable conditions. She pointed out that healing of a primary lesion, even a small one, is slow—probably never taking less than 6–8 months, and usually 2–3 years; and throughout that time there is danger of a general spread. The child should therefore be kept under observation for at least three years.

By the time they reach the age of 14, 80% of children in contact with open tubercle give a positive result on testing, and though the danger of meningitis is less over the age of 2, it remains a real one. Social services, Dr. Macpherson said, are available for protecting these children, for removing them from contact with the disease, and keeping them under observation—but the parents will not always make use of them. They are alarmed by the thought of the danger, and push it to the back of their minds; or they take fright at the many strangers by whom they must be interviewed. She considers that the entire success of protective measures for children often lies with the family doctor. He therefore needs to know what the hospital consultant, the tuberculosis officer and the child welfare worker are going to say, so that he can steer the parent into taking the right course for the child.

Reviews of Books

Food Poisoning

Its Nature, History and Causation : Measures for its Prevention and Control. ELLIOT B. DEWBERRY, FRSI. (Leonard Hill. Pp. 186. 15s.)

THIS useful book covers all forms of poisoning through food and by food. It is in three parts, dealing with bacterial poisoning; poisoning by metals, "natural" poisons of plants and animals and food allergy; and botulism. Three appendices on contamination by war gases, an author index, and a subject index, complete it. It does not touch food as a vehicle of parasites (apart from the salmonellas) and gives perhaps more space to botulism and less to poisonous plants than the present situation warrants; but in all other respects it is sound. The part if any played by human carriers in the contamination of food by the poisoning organisms is interesting. Savage believed it to be insignificant, for the organisms concerned are not human parasites so that chronic human carriers would be impossible. But some of the salmonellas can set up septicæmia; if this is merely an ante-mortem invasion it means nothing, but if recovery ever follows it the invading organism must rank as a human parasite, the poisoning be reckoned as a disease and chronic carriage as a possibility. Moreover, we do not know the source from which the staphylococci causing poisoning are derived. If they are of human origin, chronic carriage by man of this particular infection is probable. The salmonellas are parasites on animals used for food and also on rats and mice, and food infection is generally from these sources. One species, *S. paratyphi*, is limited to man, so paratyphoid must be derived from a human carrier; it sets up a human disease but is never the cause of food-poisoning. Spread of salmonellas by flies is suspected, but not proved and the localised distribution of outbreaks of food-poisoning is against it.

Surgery of the Nose and Throat

Editor: JOHN DEVEREUX KERNAN, MD, College of Physicians and Surgeons, Columbia University. (Nelson. Pp. 701. 70s.)

THIS volume maintains the high standard set by its companions. A modern outlook on operative surgery connotes an appreciation and understanding of both pathology and physiology and there are good chapters on both of these subjects. As in all books written by several people there is some overlapping. The many illustrations are not all of the same quality, and some are unnecessary; conversely some of the written descriptions might be replaced by a few good pictures. In the section on plastic surgery clarity has perhaps been sacrificed to brevity, but this is a field in which few ENT surgeons are active. Tonsillectomy in this country is now almost universally performed with the Boyle-Davis gag, and in adults intratracheal anæsthesia is desirable; but the account given of the operation is workmanlike and satisfactory. The treatment of laryngeal stenosis and abductor paralysis is described fully, and an operation devised by King combines surgical ingenuity and skill with an interesting piece of physiology. Here we are prone to give a patient with this disability a permanent tracheotomy and to dismiss the matter from our minds; it is salutary to see the thought lavished on it in other countries. Laryngofissure is readily carried out under local infiltration anæsthesia, and no tracheotomy is necessary; the wound can be closed without drainage and usually heals by first intention. Operations of slightly greater extent, including removal of portions of the thyroid cartilage, can be undertaken by the same route. Hayes Martin's method of total laryngectomy is based on sound theoretical principles, and has points in common with Babcock's method—unfortunately not described. Protracted fractional irradiation is mentioned only in the treatment of extrinsic carcinoma of the larynx. Like the technique of laryngectomy, the management of powerful doses of X rays and radium is improving; and if the end-results of radiotherapy come to approach those of extirpation, no doubt it will supersede laryngectomy as being less mutilating. The treatment of pharyngeal tumours is discussed somewhat sketchily, but in basing his treatment on the fundamental principles enunciated by Trotter, Orton is on sure ground.

THE LANCET

LONDON: SATURDAY, NOVEMBER 6, 1943

THE TONSILS AND ANTIBODIES

THE reaction in recent years against wholesale tonsillectomy is based principally on the findings that tonsillectomised children are no more resistant to sore throat, otitis media, rheumatism and nasopharyngeal infections than are children who still have their tonsils.[1] This of course does not exclude the possibility that but for tonsillectomy the former group might have had a higher incidence of these infections, nor does it mean that tonsils that are obviously diseased and a predisposing cause of frequent sore throats should not be removed. But there seems no justification for the practice, common particularly among well-to-do families, of excising enlarged tonsils as such. Indeed it now seems probable that the tonsil by trapping pathogenic bacteria, not only may act as a front-line guard against infection, but may also contribute to the production of antibodies specific against the invading micro-organisms. Enlargement of lymph-glands in response to infection is a commonplace, and is not as a rule accompanied by increase in blood lymphocytes. On the other hand, experiments by a number of independent workers[2] have supplied evidence that antibody is produced in the lymph-glands and that the germinal centres of lymph glands appear in young animals as a direct response to the injection of antigenic material like bacteria or toxins. The cells in the germinal centre are, according to MAXIMOW, primitive mesenchymal cells which may readily take on the function of phagocytic histiocytes. Enlarged tonsils and adenoids in children may therefore be interpreted as part of the body's reaction to the many foreign bacterial acquaintances which the child makes in early life.

A study by RANTZ and his co-workers[3] on the presence and persistence of specific antibodies in streptococcal throat carriers, some of whom had their tonsils removed, supplies some apposite data. Examinations were made for the presence of type-specific streptococcus agglutinins and for antistreptolysin in the blood of 64 children, 33 of whom were later proved by culture of the excised tonsil to be carriers of group A hæmolytic streptococci. Incidentally, only half these streptococcal carriers were detected by pretonsillectomy throat cultures. Among the carriers 85% had an appreciable titre of type-specific agglutinins and 70% had antistreptolysin levels of 100 units or more, which may be compared with figures of 13% and 38%, respectively in the non-carrier group. After tonsillectomy, follow-up studies for one to three months in 21 carriers showed a definite fall in the level of antistreptolysin in 19 cases; there was no corresponding fall in streptococcus agglutinins. Interpretation of these findings is not easy. The higher antibody levels in the carrier group before tonsillectomy may have been due to the persistent stimulus from the hæmolytic streptococci harboured in the tonsil, or may have occurred in response to a recent infection although the histories did not suggest that this was so. The quick and consistent fall of antistreptolysin after tonsillectomy differs from the usual findings in patients after an acute streptococcal infection where the titre is maintained at a high level for six months in about half the cases.[4] Thus the reduction in circulating antibody is presumably to be correlated with the removal of the antigenic stimulus in the tonsil. Whether the tonsil itself was contributing to the production of antibodies is doubtful, but the foregoing evidence that this tissue may constitute an important section of the antibody factory and the old observation[5] that streptococcal carriers are resistant to fresh infection, may further impress the family doctor and his surgical colleague with the need for a conservative attitude towards the enlarged tonsil.

PROFLAVINE WITH VARIATIONS

ACRIDINE derivatives were introduced as antiseptic dressings for wounds by C. H. BROWNING and his collaborators during the last war. The compound which was then recommended was acriflavine, which as commercially prepared consists of a mixture of 2:8-diaminoacridine methyl chloride and 2:8-diaminoacridinehydrochloride. This substance became popular for a time but then passed gradually out of favour, partly because it seemed unduly toxic and partly because most of the dye was diverted from the wound by its fixation on the gauze of the dressing. At the beginning of the present war, interest in this group of compounds was revived by the work of RUSSELL and FALCONER,[6] who showed that, although acriflavine might be toxic for wounds, another acridine derivative, 2:8-diaminoacridine, henceforth called proflavine, was non-irritant when applied in a solution sufficiently concentrated to be powerfully bactericidal. Next, MITCHELL and BUTTLE[7] noted beneficial effects, both prophylactic and curative, from the insertion of powdered proflavine into war wounds in the Middle East. Lately[8] they have reported on another acridine derivative, diflavine, which is 2:7-diaminoacridine hydrochloride; they found this slightly less satisfactory than proflavine since its bactericidal action is somewhat weaker while its action on the tissues is about the same. From experimental findings McINTOSH and SELBIE[9] recommend that a mixture of one part proflavine powder and one or two hundred parts of sulphathiazole should be inserted prophylactically into war wounds to prevent infection by pyogenic or anaerobic organisms.

The main obstacle to the wider use of proflavine as a wound dressing has been the fear of its toxic effect on the walls of a wound; when the powder or a strong solution is inserted into an experimental wound it causes extensive necrosis of the adjacent tissues. ALBERT and GLEDHILL[10] assume that much of this damage is due to the acidity of the preparation commonly employed. The substance which is official under the name of proflavine sulphate (*BP*) is really the bisulphate, and solutions are highly acid—thus a

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1. Epidemics in School. *Spec. Rep. Ser. med. Res. Coun., Lond.* No. 227, 1938.
2. See Burnet, F. M. Production of Antibodies. London, 1941.
3. Rantz, L. A., Jacobs, A. H. and Kirby, W. M. M. *J. clin Invest.* 1943, 22, 419.
4. Mote, J. R. and Jones, T. D. *J. Immunol.* 1941, 41, 35.
5. [illegible] 1923, 37, 483.
6. [illegible] 1940, 33, 494.
7. [illegible] 1942, ii, 416.
8. [illegible]
9. [illegible]
10. [illegible] 4, 1943, p. 87.

0·1% solution has a pH of about 2·6, while a saturated solution has a pH of 2·0. Following a suggestion by H. Berry, Albert and Gledhill urge that neutral salts should be used instead, and describe their preparation and properties. Thus the neutral sulphate is soluble 1 part in 4 at 15° C. and the pH of a 0·1% solution is 6·0, which is almost neutral (pH 7·0); the hydrobromide and the benzene sulphonate are soluble 1 in 100, while the salicylate is soluble 1 in 430, all three giving a pH of approximately 6·0 in 0·1% solution. Since Dingwall[11] has shown that the usual reaction of wounds is neutral (pH 7·4) or if grossly infected slightly acid (pH 5·0–6·0), and since living tissues are very sensitive to changes in the acidity or alkalinity of the surrounding tissues, it seems reasonable to avoid highly acid wound dressings when possible; and the neutral salts of proflavine deserve sympathetic consideration.

Nevertheless, there is evidence that the tissue damage caused by proflavine preparations is due not only to their acidity but largely to the proflavine nucleus itself. Thus Hawking[12] examined the effect of several proflavine derivatives (including some recommended by Albert and Gledhill) when inserted as powder into clean experimental wounds, the quantities employed per unit area corresponding to those recommended by Mitchell and Buttle. The compounds tested included the salicylate, the *p*-hydroxyphenyl sulphonate (soluble 1 in 420, pH of saturated solution 5·9), the hydriodide (soluble 1 in 240, pH 6·8), and proflavine base itself (soluble 1 in 3000, pH 8·6). All the compounds caused extensive necrosis of the adjacent tissues, and in a small series of animals there was little significant difference between the various preparations employed. It is possible that if a 0·1% solution had been used instead of the powder there would have been less local damage. But further investigation in the laboratory and the field is clearly needed if the advantages, limitations and disadvantages of proflavine and its derivatives are to be firmly established.

CLASSIFICATION POINTS IN ANÆMIA

Only a few years ago the size of the red blood-cells and the colour-index were the criteria for classification of anæmias. Since then work on normal and pathological erythropoiesis, and the corresponding observed changes in red-cell size and shape, have shown that these classifications were only partially correct and often positively misleading.[13] The current British view is that stated by Israels[14] in 1941: it recognises two types of erythropoiesis, normoblastic and megalo blastic; in postfœtal life, at any rate, the latter is always pathological; megaloblastic erythropoiesis is nearly always associated with increased average cell size and increased mean cell volume; in normoblastic erythropoiesis the average size of the cells may be normal, decreased or increased in different types of anæmia. Israels held that the two types of erythropoiesis are not interchangeable, and Jones[15] reaches the same conclusions in a recent American review. Jones pleads for eradication of the ideas on erythropoiesis dating from Doan and Sabin's work on non-pathological material in 1925—ideas that have only lately disappeared from British textbooks and are still repeated in most American ones. He points out that megaloblasts are found "almost entirely, if not exclusively, in patients with macrocytic anæmias of the type due to a deficiency of liver principle," and he confirms the observation that large-cell anæmias are often associated with normoblastic erythropoiesis, which means that cell-size does not by itself indicate what sort of anæmia is present and what treatment is appropriate.

Another valuable help in classification is Wintrobe's[16] finding that red cells never seem to be overfilled with hæmoglobin. They may be normally or less than normally filled; this is estimated by measuring the mean corpuscular hæmoglobin concentration, which is the ratio of the hæmoglobin content of the blood (grammes per 100 c.cm.) to the volume of the packed red cells (hæmatocrit). Thus for the morphological characterisation of an anæmia we nowadays want to know these three things.

1. Is erythropoiesis normoblastic or megaloblastic, and if it is normoblastic what qualitative variations are there in activity and morphology?
2. Is the mean cell volume (MCV = ratio of hæmatocrit to red-cell count) normal (normocytic), or larger (macrocytic) or smaller (microcytic) than normal?
3. Is the mean corpuscular hæmoglobin concentration (MCHC) normal (normochromic) or less than normal (hypochromic)?

In pernicious anæmia there is megaloblastic erythropoiesis with a high MCV and normal MCHC; the common iron-deficiency anæmia shows a distorted normoblastic erythropoiesis with low MCV and low MCHC; a hæmolytic anæmia may show hyperplastic normoblastic erythropoiesis with high MCV and normal MCHC. In temperate climates this morphological characterisation of an anæmia corresponds, for the most part, to well-defined clinical entities; so if we find a macrocytic normochromic megaloblastic anæmia we are justified in diagnosing one of the pernicious group of anæmias and proceeding with the clinical and laboratory investigations that will identify it. In temperate climates too, megaloblastosis is always associated with macrocytosis and macrocytic anæmia, whether megaloblastic or normoblastic, is always normochromic. But in tropical anæmias it seems that almost any combination can be found; Trowell[17] reported macrocytic hypochromic anæmia with and without megaloblastosis of the marrow in Uganda, and in our Oct. 23 issue Foy and Kondi reported the extraordinary combination of megaloblastic marrow with a microcytic normochromic blood-picture. These bizarre findings, however, in no way invalidate the fundamental conclusions about the classification of anæmias; they occur in patients suffering from multiple deficiencies, often over long periods, so that the morphological characterisation of the anæmia—reached by determining *average* results—only expresses which of the various deficiencies has, at the time of the examination, gained the upper hand.

As Foy and Kondi emphasise, it is especially important in deficiency anæmias to study the qualitative changes in the blood and bone-marrow and to relate these to all the available clinical information before making a diagnosis. Correct classification depends not only on accurate estimation of the hæmatocrit and the usual blood figures, but also on what JONES calls the "disciplined eye" and "the ability to recognise and appreciate differences in nuclear structure, the ability to separate pathologic from normal cells and the ability to separate normal or hyperplastic marrow patterns from dysplastic ones." Unfortunately facility in these distinctions is not easily acquired and needs experience, but, as this newer knowledge becomes disseminated, experienced investigators are able to report comparable studies. These studies on tropical nutritional anæmias may give us new information about the factors that influence blood formation, and at this time they have more than a theoretical interest, since it is only too likely that nutritional anæmia will be one of the problems that we shall have to deal with soon in Europe.

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[11] Dingwall, J. A. quoted by Schmelkes, F. C. *Surg. Gynec. Obstet.* 1943, 77, 69.
[12] Hawking, F. *Lancet*, 1943, i, 710.
[13] *Lancet*, 1942, i, 325. [14] Israels, M. C. G. *Ibid*, 1941, ii, 207.
Jones, O. P. *Arch. Path.* 1943, 35, 752.
[16] Wintrobe, M. M. Clinical Hematology, London, 1942, p. 225
[17] Trowell, H. *Trans. R. Soc. trop. Med. Hyg.* 1942, 36, 151.

Annotations

MEDICAL ADVISER TO THE TREASURY

AFTER 36 years of medical service to the Post Office, where he has watched the messengers getting bigger (and brighter) every day, Sir HENRY BASHFORD has been elected to the Treasury where he will be consulted about welfare, environment, sick absence problems, and such like for the Civil Service staffs as a whole, especially those departments which have hitherto had no medical adviser of their own. Dr. Bashford has had an entertaining journey on the way to his destination. When in 1907, three years after leaving the London Hospital, he became assistant MO to the Post Office he entered an in- [illegible] to 60—containing, as he once remarked, unworked mines of information both for industry and medicine. Nor was he a passive spectator of this human material, holding as he did that "in an industry whose supervisors, both men and women, were selected, apart from technical qualifications, by virtue of their general knowledge of, and sympathy with their fellow-beings—and above all by virtue of their ability to be blind at the right moment —one would expect both the health standard and, I hould guess, even the output to be relatively higher." hese records have already helped to destroy some nedical bogies (Bashford has been known to tilt at Iarley Street from his corner in St. Martin's-le-Grand), uch as the gravity of adolescent albuminuria, and the ower of loss of wages as an incentive to return to work. Iore recently he was a pioneer in abolishing quarantine or healthy contacts. Long before he put any of these hings on paper in these columns he had made "a plea or the more human teaching of medicine" and was uietly putting it into effect in his own practice—while his iterary diversion was the telling of bedtime stories ooth to the cognoscenti and to children. At all events luring Bashford's régime boys and girls seem to have ntered the Post Office with better physique; and, having ntered, their working capacity has gone up from year o year. If this sort of thing goes on at the Treasury t may be necessary to extend the retiring age of the Civil Service.

REMOVAL OF CALCULI FROM THE LOWER URETER

AN open operation for the extraction of a tiny calculus in the pelvic portion of the ureter is a formidable undertaking, and it is natural that every effort should be made to avoid it. A great number of techniques have been advocated for removing such calculi by intracystoscopic methods. Ainsworth-Davis[1] has found that, among these, removal by means of a ureteric corkscrew is a practical measure. During the last twelve months he has employed it in 20 cases. In 2 cases the stone came away at the time of the initial instrumentation and in 3 forty-eight hours after weight extension had been tried. In 6 cases the first attempt was a failure and the second attended with success. In 8 cases the stone was passed spontaneously within three weeks of the instrumentation. In only one case, in which the passage of the corkscrew proved impossible, was an open operation finally found to be necessary. He uses a Welland-Howard spiral stone dislodger, the design of which he has slightly modified. Its passage up the ureter is facilitated by carrying out a preliminary ureteric meatotomy.

TUBERCLE AND THE CHILD

CROWDED homes and a rising incidence of tubercle make the protection of the child contact at once more important and more difficult. A year ago the incidence of tuberculous meningitis had risen by a half and it may be more now; in London the death rate from pulmonary tuberculosis in 1941, as compared with 1938, was quadrupled in children under 4 and trebled in children between 5 and 14—the accuracy of the population figures having been carefully checked.[1] According to Sheldon and his colleagues[2] many young children at present elude the tuberculosis officer in his search for contacts. They note, too, that the exposure of a child to infection need only be short; two children who spent a single night in the house of a phthisical aunt became infected and one died. To ensure full investigation of child contacts they suggest special clinics for them at hospitals, where the tuberculosis officer should be affiliated to the staff, ultimate responsibility resting on the pædiatrician. On another page Professor Fleming insists that most children are infected from a human source, and that the younger the age at which infection takes place the greater the risk to life. Moreover, the usual route of infection is through the respiratory tract. That the young child ought to be shielded from infection is self-evident; how to achieve it is a different matter. Prof. Fleming would like all children under four who give positive tuberculin skin reactions to be placed in suitable surroundings and kept under careful observation. But as Dr. Margaret Macpherson pointed out (p. 574), in addressing the Medical Women's Federation, the parents are not always willing to be parted from their young children; and they may think him too precious to send out of their sight, even though it costs his life. Removal of the infectious patients, rather than the baby, from the home may be the more practical proposition; for though only a half-measure it has the merit of being acceptable. The young child with an early infection is also at the mercy of parental love. If he can be taken to live in the country, given an ample diet, and carefully supervised, well and good; but for the child whose home is a crowded house in a slum this may be impossible. Prof. Fleming's suggestion that special preventive institutions should be built for such children has attractions, but dangers too. Enthusiasm for the cure of one infection should not blind us to the fact that the young child is vulnerable to others, and that he is more exposed to them in a residential institu- [illegible] than he is at home. We [illegible] the fact that the proper [illegible] ns largely on the provision of more and better houses for the people.

The threat carried by the older child with tubercle to his associates at school, at home, and in billets was well brought out by Dr. Marcia Hall's study of a group of such children in a reception area.[3] One child infected

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1. Ainsworth-Davis J. C. *Brit. J. Surg.* 1943, 31, 34.

1. Daley, W. A. and Benjamin, B. *Brit med J.* 1943, ii, 417.
2. Sheldon, W., Graham, S., Gaisford, W. and Lightwood, R. *Arch. Dis. Childhood*, September, 1943, p. 157.
3. *Lancet*, 1943, ii, 35.

2 others in her billet (one of whom died) and 4 children at school. Another infected 3 out of 5 children at his billet and 6 at school. Another child, a known contact of an open case, had escaped investigation and developed miliary tuberculosis and infected her cousin and brother at her billet and 8 out of 39 children in her class at school. The danger of meningitis is much less among children over the age of seven who take the infection; but they can be a cause of fatal disease in their younger associates. Until we find the compound which will strike through that waxy overcoat and kill it in the body we must be content to conduct a guerilla warfare against the tubercle bacillus; and it must be harried continuously. The methods are: to investigate and follow up all contacts; remove the open case from contact with his family, especially with the younger children; supervise cases carefully during healing; and, all the time, press for better housing.

PSYCHOLOGICAL TESTING IN GERMAN FORCES

IN 1941 Ansbacher gave an impressive review of military psychology in Germany[1] and the American Committee for National Morale issued a book[2] showing that the use of psychology for military purposes had been carried a very long way by the Germans. Gillespie[3] wrote of this survey that it "makes clear the breadth and intensity of what might be called psychological organisation of the German Army and people for war," and that the long psychological preparations of the Germans showed a "combination of academic science with the ablest commonsense." He noted, however, also that the military branch did not fully accept the need for psychologists in the Services; and we pointed out[4] that there had been sudden changes of policy not only in the Army but also in the Luftwaffe, and that there were defects in the reported German procedure for selecting officers and specialists. It now appears that the psychological testing service was much curtailed during 1942, first in the Luftwaffe, then in the Army. Ansbacher,[5] commenting on the report of this published in the Swiss medical review *Praxis* in October, 1942, is reluctant to believe that the curtailment was due to unsatisfactory results but is rather disposed to infer that the procedures proved impracticable under war-time conditions. This opinion depends on the large number of trained psychologists required for assessing character, since there are no standardised tests which give so true a picture of the tested person as a series of clinical judgments in realistic situations. An immense number of military psychologists would have been needed for the large German Army and Air Force, but already by May, 1940, a shortage of them had been reported, and in 1941 an expanded system for training applied psychologists was instituted. A lower qualification, "psychological diploma," was created for the products of this scheme, the previous qualification having been the standard Ph D in psychology. Ansbacher assumes that this attempt to provide a sufficient number of persons competent to perform the required duties proved inadequate, especially in the Luftwaffe.

He goes on to compare this course of events with what has happened in the United States, where, he says, the clinical approach has been deemed impracticable at present and the emphasis has been put on standardised tests, fortified by ratings supplied by trained interviewers, commanding officers or special selection boards. Until fuller details are made public as to the procedure employed in officer selection in the American army, it is impossible to judge how far this indicates that the American procedure differs from the British methods of selecting officers, in which a partially clinical approach has been found useful, along with standardised tests and ratings by combatant officers and other persons without specialised psychological training. The hypothesis which Ansbacher rejects—namely, that the results of German military psychology have proved unsatisfactory—may however prove to be the correct one, since the application of a procedure that is by no means wholly objective requires personnel with specialised experience and sound judgment, such as cannot be acquired in a brief ad-hoc training.

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1. Ansbacher, H. L. *Psychol. Bull.* 1941, **38**, 376.
2. German Psychological Warfare. Committee for National Morale, New York, 1941.
3. Gillespie, R. D. *Brit. med. J.* 1942, i, 445.
4. *Lancet*, 1942, ii, 100.
5. cher, H. L. *Science*, Sept. 3, 1943, p. 218.

ANTICONVULSANT DRUGS

THE search for drugs that will stop fits without harming the patient has not been altogether in vain. In the last generation, phenobarbitone and phenytoin have been two outstanding gains, but with neither is effective dosage always free from unpleasant symptoms. It is now claimed that the sedative effects of large doses of phenobarbitone can be avoided by the addition of benzedrine.[1] The toxic effects of phenytoin are more serious, and too often make it necessary to give a dose well below that needed for maximum therapeutic effect. Some modification of this drug retaining the anticonvulsant properties but eliminating its toxic effects would be welcome. Study of the mode of action of known remedies is also proving suggestive. Two years ago Cohen and Cobb showed that azosulfamide ('Prontosil S') has a definite anticonvulsant action on some epileptics.[2] Now, with Coombs and Talbot, they have published the results of an intensive biochemical study on two of their patients, one suffering from grand mal and one from petit mal.[3] While receiving azosulfamide in doses sufficient to reduce or stop their fits, these patients showed, under strictly controlled metabolic conditions, a decrease in CO_2 content and tension in the serum, some lowering of pH, and a positive potassium balance. It has long been known that a swing towards acidosis is likely to discourage attacks, especially of the petit mal or slow-wave type. Ammonium chloride produces this swing; but it has no anticonvulsant effect, nor does it produce a positive potassium balance. Phenobarbitone produces a positive potassium balance, but no acidosis. These observations are suggestive, but the authors offer no explanation of the mechanism by which storage of potassium is achieved; nor is there reason to think that the mere administration of potassium salts is likely to be clinically effective.[4]

Petit mal or slow-wave activity is less amenable to phenobarbitone and other anticonvulsants than are major fits, but is more amenable than major fits to starvation and the ketogenic diet. With these forms of treatment, again, we get acidosis, and many endeavours have been made without definite result to find out what substance is responsible for the control of the attacks. Price, Waelsch and Putman have been experimenting with *dl*-glutamic acid, a substance which gives rise to the excretion of the unnatural isomer in the urine.[5] One molecule of *d*-glutamic acid hydrochloride should furnish one molecule of hydrochloric acid and two carboxyl groups of which one would be available for acidification. Moreover, brain tissue contains an enzyme which synthesises glutamine from *l*-glutamic acid and ammonia, thus decreasing the free ammonia in the tissue. Sufficient *dl*-glutamic acid hydrochloride was given in capsules to 7 patients to maintain the pH of the urine at about 5·0. Toxic effects were small. Reduction in seizures characterised by slow-wave activity—petit mal, psychomotor seizures—was observed, but in no case were the attacks

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1. Robinson, L. J. *Amer. J. Psychiat.* 1941, **98**, 215; Cohen, B. and Myerson, A. *Ibid*, 1938, **95**, 370.
2. Cohen, M. E. and Cobb, S. *Arch. Neurol. Psychiat*, 1941, **46**, 676.
3. Cohen, M. E., Coombs, F. S., Cobb, S. and Talbott, J. H. *Ibid*, 1943, **50**, 111.
4. Hirschfelder, A. D. and Haury, V. G. *Ibid*, 1938, **40**, 66.
5. Price, J. C. Waelsch, H. and Putman, T. J. *J. Amer. med. Ass.* 1943, **122**, 1153.

completely stopped. The patients were all happier, nearer the normal, and more alert physically as well as mentally. The number of cases is too small, and the periods of observation too short, for final judgment; but it looks as if there were a case for further trial of this compound, its derivatives and allies; and for study of its effects on potassium storage.

DESOXYCORTICOSTERONE AND BLOOD-VOLUME

ALTHOUGH desoxycorticosterone acetate has been used in the treatment of Addison's disease since 1937, little work has hitherto been published on its effects in normal subjects. In patients with adrenal insufficiency, adequate dosage rapidly restores the body chemistry to normal; but if the drug is given in excess for long periods, especially with additional salt, it may give rise to an increase in plasma-volume, with œdema and abnormally raised blood-pressure, leading in some patients to cardiac failure.[1] Its administration in large quantities (20 mg. daily for 70 days) to normal dogs, without added salt, produced hypertension of moderate degree and no evidence of cardiac enlargement or failure; but there were definite chemical changes in the blood, notably a fall in serum potassium to about half its original level, with a less dramatic rise in serum sodium and chloride.[2] The low serum potassium was associated with periodic attacks of weakness—manifested by inability to stand or raise the head—resembling closely attacks of familial periodic paralysis; and, as in that condition, the attacks were rapidly relieved by potassium. Similar muscular weakness was also noted in one human patient by Thorn and Firor. These seem to be the only examples, apart from familial periodic paralysis, where a low serum potassium is associated with attacks of weakness. Very low serum potassium has occasionally been found in alkalosis, and after large doses of insulin and carbohydrate in normal subjects, without any appreciable muscular signs.

Clinton and Thorn[3] have investigated the effect of desoxycorticosterone acetate on the plasma-volume and electrolyte balance of normals. When 10 mg. of the hormone were given intramuscularly in oily solution once daily for 5 days, plasma-volume rose, the hæmatocrit value fell, and there was a fall in urinary excretion of sodium and chlorine. The maximum increase in plasma-volume was 26% of the initial value, and the mean for three subjects was 17%. When, in addition, 6 g. of salt were given daily, much of the added salt was retained, but the mean increase in plasma-volume was almost identical. A longer experiment, using the same dosage for 15 days, showed that the chief effect was produced within the first 4 days, and further rise in plasma-volume after that was very slow. Towards the end of the period there was evidence of new red-cell formation, the total red-cell volume increasing by nearly 10% during the experiment. There is no mention of any change in the serum levels of sodium or potassium. After cessation of treatment plasma-volume returned to normal, or slightly less, within 3 days. The efficacy of intramuscular and sublingual administration was also compared: a daily dose of 40 mg. (four 10 mg. tablets) daily sublingually produced only about half the effect on plasma-volume of one daily dose of 10 mg. given intramuscularly.

These findings all show that desoxycorticosterone acetate in moderate dosage is capable of producing in normals a definite change in blood-volume in a comparatively short time, and that sublingual administration is uneconomic and ineffective compared with the intramuscular route. In none of the experiments was there any evidence of toxic changes, such as œdema, hypertension or cardiac enlargement, but the period of experiment was very short compared with some of the treated cases of Addison's disease, and the dosage minute compared with that used by Kuhlmann and his colleagues for their dogs.

HELD TOGETHER BY THE PAINT?

AT the opening session of the Leeds Medical School last week Sir John Graham Kerr, FRS, confided his fear at the trend of modern education to an audience whose biological training had made them appreciative listeners. In man's evolution from the microbe his increasing size had been accompanied by an ever-increasing complexity of organisation, bringing speed of movement and vast powers of defence and offence, but with them the growing danger of destruction of the whole from functional failure of a component part. The introduction to his address was like the Disney picture of the awful end of the great reptile left alone while evolution passed him by. Communal evolution has its counterpart. Gigantic civilised states depend on the smooth and effective working of all their parts; centralised government control slows down the corrective reaction to emergency and takes responsibility away from those directly in touch with local needs and conditions. Let us, he said, reverse the process by decentralising. A sojourn in his early life with a primitive race in the Gran Chaco had enlightened him on the right system of direction for life—training in observation, training in the interpretation of observations, development of the habit of mental alertness. These three, plus a code of tribal ethics, had been the education of the primitive Indian community and of our own ancestors. The invention of the printed word with its possibilities of mass education had shifted the balance: today book-learning and literary culture had become the main qualifications of education.

> "I remember many years ago," he said, "having an interesting talk with a friend whose hobby it was to know all about the Clyde passenger steamers. I asked him about one particularly venerable one—the old *Ione*—and he remarked darkly 'She's held together by the paint' Do we not in these days tend to rely too much upon the paint of culture as holding our civilisation together, and to neglect rather the underlying steel framework on which real safety depends?"

Sir John would have us restore to their position those three essential factors on the training of primitive man. Such training survives indeed in the pre-school years and is rejoined when the boy embarks on his special vocation in life. Between, imprisoned in a school-room, he absorbs and memorises snippets of information—geography, history, various sciences, foreign vocabularies—without observing and puzzling out the meaning of what he observes. He is misled by the fallacious distinction between working with the hand and working with the head, when the skill of craftsmanship is in reality no less an expression of brain activity than the production of a thesis. The biologist knows that all men are born unequal, they differ in their heritage of biological capital. Its variety rules out mass production. Successful education depends upon the proper treatment of this heritage by coining it into a currency with high exchange value in the life of the individual. Uniformity during the primary phase, yes; but only to lay foundations for the development of diversity in the later phases of school, workshop, university and vocational career.

DR. F. J. POYNTON, who died at Bath after a heart attack, was consulting physician to University College Hospital, and to the Hospital for Sick Children, Great Ormond Street. It was his great work with Alexander Paine on the ætiology of rheumatism that quickened the search for a bacterial noxa. He was in his 75th year.

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[1] Thorn, G. W. and Firor, W. M. *J. Amer. med. Ass.* 1940, 114, 2517; McCullagh, E. P. and Ryan, E. J. *Ibid*, 1940, 114, 2530.

[2] Kuhlmann, D., Ragan, C., Ferrebee, J. W., Atchley, D. W. and Loeb, R. F. *Science*, 1939, 90, 496.

[3] Clinton, M. and Thorn, G. W. *Bull. Johns Hopk. Hosp.* 1943, 72, 255.

Special Articles

INCIDENCE AND TREATMENT OF TUBERCULOSIS IN CHILDREN

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(From the Department of Pædiatrics, Glasgow University and the Royal Hospital for Sick Children, Glasgow)

IN children dying of tuberculosis, by far the most usual route of infection is through the respiratory tract. Blacklock (1932), for example, found that of 283 tuberculous children examined post mortem, 61% had the primary site of infection in the thorax.

This fact does not seem to be generally recognised—partly no doubt because of the difficulty of detecting chest lesions in children by ordinary clinical methods and partly because meningitis often develops before chest signs become evident. Most statistical reports assign deaths from meningitis to the non-pulmonary group, whereas in three-quarters of them the primary focus is in the lung. Blacklock and Griffin (1935) found a primary thoracic focus in 74% of 241 cases of tuberculous meningitis examined post mortem, and in 100 consecutive cases of tuberculous meningitis admitted to the Royal Hospital for Sick Children between April, 1939, and October, 1942, I found that 80 had primary lung infections and 6 primary abdominal infection, while in 14 the primary source of infection was not determined. The evidence of thoracic infection was obtained either at autopsy, or by radiography or by detection of tubercle bacilli in the sputum or stomach washings.

As tuberculous meningitis is the usual terminal event in children dying of tuberculosis, it follows that infection through the respiratory tract is the main cause of death from tuberculosis in children. Such infection, at any rate in the fatal cases, usually arises from human contact.

TABLE I—PERCENTAGE OF CHILDREN SHOWING POSITIVE MANTOUX REACTION (1938–42)

Age (years)	Total no.	Mantoux—positive	% positive
0– 4	3048	286	9·3
4– 7	604	159	26·3
7–10	490	187	38·1
10–13	301	135	44·8

The majority of children sooner or later become infected with tuberculosis. Using the tuberculin skin reaction as a test, it has been shown that only a small proportion of those under one year old give evidence of infection; but as age increases positive skin reactions become more and more frequent, so that at the age of twelve 50% and at twenty 70% are positive (D'Arcy Hart 1932, Blacklock 1936, Price 1941). Table I gives the incidence of positive reactions to the Mantoux test (1/1000) in children admitted to the Royal Hospital for Sick Children from 1938 to 1942 inclusive. The figures are in fairly close agreement with those of other workers. Many children recover completely and a considerable number pass through this primary infection without symptoms. In a certain number, however, the disease progresses, and in these death usually results from miliary spread and tuberculous meningitis. The problem of how to prevent this is of great importance.

It can be shown that positive Mantoux reactions have a much less grave significance in older children than in young children and infants. The incidence of tuberculous meningitis, the usual cause of death, falls with increasing age. Of 326 children dying of tuberculous meningitis in the Royal Hospital for Sick Children between the years 1931 and 1943, 70% were under four years old (table II). These figures correspond closely with those of Blacklock and Griffin (1935). The great danger of infection in young children is shown in table III. Of a series of children with positive tuberculin reactions [illegible]tted to the Royal Hospital for Sick Children, 286 [illegible] under four years of age, and one-third of these [illegible] of tuberculous meningitis; whereas 322 were over seven years of age and only 5% of these died of tuberculous meningitis.

PRACTICAL IMPLICATIONS

From the foregoing discussion two important points emerge.

1. The majority of children are infected with tuberculosis from a human source.
2. The younger the age at which infection takes place, the greater the risk to life.

Evidently, then, young children should be shielded from infection and protected from its consequences. In the first place they must be guarded against contact with a carrier of the disease; no one who has open tuberculosis should have any association with a young child. This means that when a member of a family develops symptoms, the whole household should be thoroughly examined, and all who are found to have open tuberculosis should be isolated. Secondly, children under four years of age who give positive tuberculin skin reactions should be placed in suitable surroundings and kept under careful observation.

TABLE II—AGE-INCIDENCE OF TUBERCULOUS MENINGITIS (1931–43)

Age (years)	No. of cases	% of total		Age (years)	No. of cases	% of total
0–1	66	20·24	70	7– 8	7	2·14
1–2	81	24·84		8– 9	12	3·68
2–3	48	14·72		9–10	6	1·84
3–4	33	10·12		10–11	4	1·22
4–5	28	8·59		11–12	8	2·44
5–6	20	6·10		12–13	1	0·30
6–7	12	3·68				

To put this policy into effect, a great extension of sanatorium accommodation will be necessary for the isolation of all carriers; but there is little doubt that, if it could be accomplished, human tuberculosis would soon be eliminated from the community. By eradication of the carriers, a herd of cattle can be freed from tuberculosis. The same result should be possible in a community of human beings.

The young child with early infection requires special treatment. Most of these children are not infective; in the early stages the lung lesion is closed and in any case young children do not expectorate. Hence isolation need not be rigorous. The child should live in good conditions in the country and should be guarded from the exanthemata and other infections. To promote healing of the thoracic lesion he should have an ample supply of milk and cod-liver oil or some vitamin-D preparation. For economic or other reasons it may often be necessary to provide institutional treatment. Tuberculosis sanatoria are not suitable for young children, and the fact that the child is suffering from tuberculosis, even though it is of the closed type, usually bars his admission to a convalescent home. To meet these difficulties special arrangements should be made. Sections of existing convalescent homes for children might be set apart for these cases, or special institutions (preventoria) might be built. Six months' residence in the home will as a rule suffice, for it is in the first few months after primary infection that dissemination usually takes place. Once healing has commenced, miliary spread becomes unlikely.

TABLE III—INCIDENCE OF TUBERCULOUS MENINGITIS IN CHILDREN WITH POSITIVE MANTOUX REACTIONS

Age (years)	Positive Mantoux	With meningitis
0– 4	286	92 (32·1%)
4– 7	159	26 (16·3%)
7–10	187	11 (5·8%)
10–13	135	5 (3·7%)

SUMMARY

Children dying of tuberculosis are usually infected from a human source.

Under seven years of age, *infection with tuberculosis involves grave danger to life*

Great care should be taken to prevent contact between young children and adult carriers

Young children giving positive tuberculin skin reactions should be removed to suitable surroundings and kept under observation for about six months

REFERENCES

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CONFERENCE ON MENTAL HEALTH

THE new Provisional National Council for Mental Health held a one day conference in the Caxton Hall, London, on Oct 29 The Council which substantially takes over the work of the Mental Health Emergency Committee, incorporates the *Central Association for Mental Welfare* the Child Guidance Council, and the National Council for Mental Hygiene This amalgamation was one of the principal recommendations of the Earl of Feversham s Committee, which reported just before the outbreak of war

Mr **ERNEST BROWN**, *Minister of Health, who opened* the conference gave two main reasons for welcoming [illegible] of the Council s tasks would be to educate public opinion Earlier action must be taken against mental trouble, and the number of outpatient centres and child guidance clinics must be increased The Council would cooperate closely with the new local authorities which the Govern [illegible] physical and mental disorders

Sir **OTTO NIEMEYER**, the chairman, speaking on the development and extension of voluntary mental health services, emphasised that the present council was pro [illegible] development of mental ill health in the first five or six years of life, and the importance of character building to ensure normal mental and er [illegible] of giving advice on the [illegible] mics, the placement of [illegible], its residential homes [illegible] library and its journal

LOCAL AUTHORITIES

Dr **THOMAS BEATON**, supt of St James Hospital for Nervous and Mental Disease Portsmouth described the evolution of a coordinated mental health service in a relatively isolated city When he had taken over his hospital in 1926 the post of medical superintendent had *already been combined* with that of medical adviser to the statutory committee for mental deficiency This [illegible] erlapping and the shelving [illegible] patients He had started [illegible] voluntary hospital as a [illegible] blem of abnormal conduct or of mental or nervous disorder, functional or organic He had always cooperated very *closely with the general* practitioner, through whom alone could the work be carried into the community He had borrowed the secretary of the local voluntary association to keep records, and this link had worked very well For many reasons the neurotic or mental patient ought not to be treated in the wards of a general hospital The patient had much more liberty in a mental hospital, where eccentricities p[illegible] result He ha[illegible] patients to ent[illegible] culty of persua[illegible] disorder to ente[illegible] bogy vanished [illegible] *than to get the patient into a general hospital* and then tell him after much difficulty and trouble that he had to go into a mental hospital after all

The work of the clinic had said Dr Beaton, gradually increased until now it employed three full time psychiatric social workers In 1931 no further need existed for the local voluntary association and *it had been incorporated* into the Nervous and Mental Treatment Department—an innovation peculiar, as far as he knew, to Portsmouth This department was housed in the centre of the city , it handled all the legal work connected with the Mental Deficiency and Lunacy and Mental Treatment Acts provided a central bureau for information and liaison with all other services and with voluntary activities such as charitable organisations, the citizens advice bureau and the juvenile courts Its records covered eight or nine thousand cases and their families The department had proved invaluable, and was the keystone of the mental health organisation of Portsmouth Something of the kind should be incorporated into any contemplated mental health service A mental treatment committee of the city council had been formed by combining the visiting committee and the mental deficiency committee The observation ward of the infirmary was visited daily by a medical officer of the mental *hospital* , many cases of puerperal or post operative origin were detected in this way No obstacle was interposed between the rate aided patient and the psychiatrist All patients were dealt with purely on their clinical requirements the mental hospital informed the public assistance officer that a patient had been *admitted*, and all the legal and *administrative* formalities were dealt with through the usual channels The relieving officers had been asked to cooperate and would frequently bring patients for admission on a voluntary basis Their work had been substantially eased and t[illegible] valuable assistance A second [illegible] been instituted in 1938 at t[illegible] nd worked in close association with the school medical officer and the director of education Delinquent children of school age were seen at the school clinic, but those over 14 who needed more time were seen at the main child guidance clinic

The mental hospital itself had been radically adapted to the new field Its name and its atmosphere had been completely changed together The separate villas in the grounds had proved very suitable for the new type of case No distinction was made between voluntary and certified patients they were treated according to their clinical state Red tape and formality were abolished , patients and their relatives were made to feel at home and in touch with ordinary life Much work was done, especially through the voluntary bodies to inform and educate the public about the realities of mental hygiene Independence of the public health service was, Dr Beaton concluded, essential to the *mental health organisation* The psychiatrist *must have* freedom of initiative, and his patients were not amenable to the officialdom governing the material problems of public health He hoped the relative autonomy of the committee of visitors would be safeguarded so that they could realise their projects without constant control and supervision by the local authority

Mr F R **DAVIES** deputy clerk of the Berks CC outlined the psychiatric work done in his county on unbilletable evacuated children and on resident problem children Mr J **DUNCAN**, headmaster of Lankhills special school, spoke on the residential school and its place in the education of defective and subnormal children

Sir **FARQUHAR BUZZARD** chairman of the afternoon session urged the Council to undertake a campaign among education authorities to include training in health matters in their curricula

WAR CONDITIONS

Mental health Dr **IAN SKOTTOWE** said, was assessed in an individual by the extent to which he persistently succeeded or failed in adapting himself to the social medium in which he lived Mental ill health was manifest when he was no longer able to carry on his manifold activities as a person, as a member of a social group without special external help. The incidence of such failure could be assessed by the annual number of new cases reaching hospitals and clinics, but also by the more subtle indications of social morale such as the suicide-rate, illegitimate birth-rate, incidence of venereal diseases, convictions for drunkenness, soliciting, sexual offences and crime generally, by some kinds of industrial unrest, by church attendances, and by mass demonstrations. These wider social activities were very liable to misinterpretation, but an inquiry into their significance would be of great value—for example, a study of venereal disease patients by a psychiatrist and a psychiatric social worker. The factors leading to promiscuity were essentially proper matters for such investigation. Wild, dramatic and hasty assumptions were to be eschewed. Another approach to the problem of communal mental health was to study some special experience—for example, the bombardment of civilians from the air and the incidence of mental illness in its victims. Of 127 such people investigated by Fraser, Leslie and Phelps, 34% developed nervous symptoms, but only about 6% kept them for long. Of 35 persons buried for more than an hour one-third had no neurosis, one-third had temporary neurosis and one-third suffered for more than 10 months. Many observers had shown that some 80% of sufferers from such persistent war neurosis had a history of previous attacks or had shown constitutional instability. Reports from most of the bombed areas had been collected by Aubrey Lewis, and showed that air-raids had not been responsible for any striking lasting increase in neurotic illness. There was reason to believe, as Fairbairn had so cogently argued, that separation from a solid family or social background (rather than from a particular person or place) was the most potent factor in bringing to light unhealthy psychological tendencies.

A study of the population of Buckinghamshire, which had increased from 310,000 in 1938 to 407,000 in 1941, showed that 241 cases had been admitted to the mental hospital in 1938, a rate of 7·7 per 10,000, whereas in 1941 the rate was only 6·4. The rate among the new population (who had entered during the war) in the latter year was 7·1, and among the old population 6·1. A very different picture was shown by the less serious disorders: the actual rate of new outpatients had multiplied by about 4 times. Of the 182 new outpatients in 1942, 31 had not lived in the county before the war; the incidence of the less serious disorders was 3·4 in the new population and 4·8 in the stationary population. It was difficult to avoid the conclusion that there was some slow increase in the incidence of mental illness and that the social conditions of war were relevant to it. The long-wearing process of maintaining abnormal ways of life without the stimulus of any action was making itself felt. It was not, however, increasing the more lasting and serious social failures, and the minor disorders were readily remedied. The most characteristic cases were seen at the beginning and towards the end of active occupational life. Alcohol showed a slight diminution as a causal factor and syphilis an increase. There was certainly no ground for alarm or despondency, but there is much to be done.

Miss L. G. **FILDES**, PH D, then spoke on the selection and classification of homes and hostels in relation to the needs of the individual child.

MEDICINE AND THE LAW

Bequests to Hospitals

CHARITABLE institutions advertise themselves patiently in legal journals; yet from time to time the object of a bequest is so imperfectly described that the testator's estate must pay for litigation to identify it. Mr. Justice Uthwatt has recently had to decide that the Manchester Royal Infirmary and the Royal Liverpool United Hospital were each entitled to legacies of £105,000 bequeathed by the late Mr. John Ashton Fielden to "Manchester Infirmary" and "The Liverpool Infirmary." It may be unjust to scold the lawyers for these misdescriptions; many testators have drafted their own wills. The usual books of reference give lists of hospitals; human nature is too lazy to consult them.

The law, of course, can tolerate no inexactitude. the Earl of Cardigan was charged with wounding Tuckett in a duel on Wimbledon Common a years ago, he escaped conviction at the hands of because of a mild discrepancy between the name of his victim as given in evidence and the name specified in the indictment. One was Captain Tuckett, the other was Captain Harvey James Tucket; there was no sufficient proof of their identity. Things are different now, even in the strict conditions of a criminal trial. A trivial error of misdescription in a bequest does not invalidate the gift if the giver's intention is clear. To describe a beneficiary as "rector" when he is really a "vicar" is not fatal. The rule is the same where charitable bodies are beneficiaries as where an individual is concerned. A beneficiary has sometimes been held sufficiently described if designated by a nickname or even by a wrong name proved to have been habitually used by the testator. Sometimes, of course, societies are amalgamated or change their names. A gift for the benefit of volunteers, yeomanry and militia units found its way successfully to the subsequently created Territorial Army. Occasionally a more awkward case is encountered. A bequest to the "King's Cross Hospital" went to the Great Northern Hospital, King's Cross, rather than to the King's Cross Hospital at Dundee. Another to the "Westminster Hospital, Charing Cross," was construed as meaning the Charing Cross Hospital rather than the Westminster Hospital.

It is a pity that law costs should eat up the money which is intended for charities. Naturally a testator may, especially if he uses stock forms of legal language, create difficulties for his executors. The courts have had to decide that a bequest of "furniture and effects" did not include jewellery or a motor-car, that "other articles of household use or ornament" did not include kangaroos and emus, "plate" did not include plated or silver-mounted goods, but that "books" did include the MS log-book of HMS *Victory*. These problems happen easily when a man signs a document without mentally cataloguing all his effects. They need not happen when he wants to be generous to a hospital; it is easy for him to give the institution its proper title.

HOME FROM GERMANY

WITH the prisoners-of-war who recently returned to this country from Germany came 25 officers of the Royal Army Medical Corps whose members, under the Geneva Convention, are protected personnel. We are glad to welcome the following:—

Colonel G. A. D. Harvey, CB, CMG, LRCPI
Lieut.-Colonel F. J. Morris, LRCPI
Lieut.-Colonel T. A. S. Samuel, MRCS
Major J. Burns
Major J. H. T. Challis, MRCS, DA
Major J. A. Chapel, MD EDIN.
Major W. N. S. Donaldson, MB GLASG.
Major C. H. Imrie, MB ST. AND.
Major R. Mackay
Major G. C. Steel, MRCS, DA
Major W. Eldon Tucker, FRCS
Major E. R. C. Walker, MB EDIN, FRCPE
Captain N. D. Allan, MB ABERD.
Captain A. D. Aveling, BA CAMB, FRCS
Captain E. R. Dansie, MB LOND
Captain M. Egan
Captain T. K. Elliott, MB LOND.
Captain P. A. Forsyth, MRCS
Captain E. M. Fraser
Captain R. W. Gunderson, MRCS
Captain W. C. Harris, MB GLASG.
Captain Isaac Jacobson, MB CAPE TOWN
Captain J. D. Recordon, MB ST. AND.
Captain G. E. Stoker, MRCS
Captain G. S. Trower, MB CAMB.

SUPPLEMENTS FOR THE UNDER-FIVES.—Cod-liver oil, orange juice and ferrous sulphate tablets are to be supplied free of charge this winter to all children under 5 in full-time attendance at elementary, nursery and other day schools. Each child will be allowed a 6 oz. bottle of concentrated orange juice every 4 weeks and a 6 oz. bottle of cod-liver oil compound every 12 weeks. This is additional to the vitamin products which parents can buy on surrendering the child's coupons; it is thought that many children are not receiving these supplements at home. Ferrous sulphate tablets, gr. 3, will be available for children needing them, in the opinion of the medical officer, for the cure or prevention of anæmia. The dose suggested for children aged 2–5 is a tablet on alternate days for the first week, a tablet daily for the next fortnight, and two tablets daily for the next 6 weeks, the course being repeated if necessary after an interval of a month. Larger doses may be needed for cases of pronounced anæmia.

In England Now

A Running Commentary by Peripatetic Correspondents

As a Field Unit we were rather apprehensive about the prospect of having nursing sisters It was not that we doubted that they would be an asset to us in the wards, but we were frankly afraid that their susceptibilities would be offended by the rough living conditions. The postponement of their arrival was hailed with sighs of relief all round the mess. However, one fine day an umbulance drew up outside the company office and eight charming QAIMNS tripped out headed by a charge sister. The orderly medical officer sized up the situation in a trice and reported breathlessly to the OC who was enjoying a well-earned gin and lime in the mess. The effect was electrical. The PMC and SMC were summoned. Arrangements were "laid on" (everything n the Army is "laid on") for tentage, for feeding utensils, for furniture, and a dozen other things including every modern convenience. Nobody was more astonished han the sisters to see the elaborate provision that was rapidly made for their comfort and segregation. They vent so far as to say that they had never been accustomed o such luxury even in a base hospital. From the noment they appeared in the wards in their very attractive and one might say reassuring uniforms, there was a otally different atmosphere. Patients as well as orderlies became much more restrained. Conversations were conducted in subdued tones instead of irate brawling. The practice of [illegible] with omewhat pun[illegible] More mportant was [illegible] who vere seriously ill. The orderlies were quick to notice he sisters' skill in handling sick men, and were anxious *o acquire the art themselves. Nothing has been more* remarkable than the willingness of the orderlies to carry out in every detail the instructions given by the sisters. [illegible] cold water. Treatment books which were formerly untidy and thumb-marked have been abandoned in avour of sister's neatly ruled book which provides a pace for every conceivable eventuality. Litter and general untidiness have disappeared like snow off a dyke. n a word, the sisters have gently but firmly exercised heir authority and have effected a transformation. This is becoming somewhat maudlin, so enough.

* * *

I walked about 20 miles to get mushrooms—well, say 3. I even made a sortie into the barbarous county of Kent, where grow a swarthier sort. They are scarcer han they were last week because of the moon.

'The waxing moon drives swains to Lovers' Lane
And makes the fatuous fungus hide its head.
O greedy Mother, do not be profane;
Hang up the frying-pan, pretend Desire is dead."
CHRISTINA ROSSETTI.

We could not be so nice and discriminating. We had o take all the deformities—lamella vara, valga, and vulga. We even accepted those who were living in myocetal sin with one slug. Never with multiple slugs. Thank God, we still have our standards. But we did pass a conjoined twin (wrapped in a special piece of paper). "Damn it all," said the President, "I don't see why they or it shouldn't make as good cannon fodder as the rest of 'em. Let them face the frying-pan!"

* * *

A favourite question to the Brains Trust was "what are the seven wonders of the present-day world?" One brains truster sensibly said that, for purposes of comparison, the present-day list, like the ancient one, should be made up of buildings. Such a definition comfortably narrows the choice and makes the competition easier. I do not remember all those mentioned by the Brains Trust, but among them were the Empire State [illegible] and the [illegible] I have [illegible] her two, and the common denominator of all three appears to be bigness, which in itself I do not regard as wonderful. Taken in conjunction with modern engineering appliances, the Empire State Building does not make me wonder except why it had to be so big. The Pyramids of Ghizeh and Sakkara do make people wonder how they were [illegible] e spot and without t[illegible]

No [illegible] the Taj Mahal at Agra, but I think that anyone who has seen it would put it first on the list. I went to Agra prepared to be critical of the Taj, because my mind has a mulish resistance to anything, such as a best-selling novel, which appears to be over-praised. The paintings, photographs and models of the white tomb on the banks of the Jumna had left me with a sense of coldness and disappointment. "What," I thought, "are all these people raving about?" The wonder of the Taj Mahal turned out to be something which has never yet got on to a painting or a photograph and certainly not into a [illegible] of peace and happiness pervaded everything and everyone from the bats hanging upside down in the trees to the soft-eyed Indians and be-cameraed tourists on a trip round the world. No-one spoke much and when someone did it was in soft modulated voices. An Indian next to me on the bench made a caressing reference to "our dear and lovely Taj Mahal" and praised Lord Curzon for rescuing it from vandalism, and for having the gardens made and kept in order. In fact he created the Department of Antiquities to look after the ancient monuments in India. "We in India," said the Indian, "owe a lot to the ardour of Lord Kurzān." The best description I know of the spirit of the Taj is to be found in Sir Frederick Treves's *The Other Side of the Lantern,* and having read it after I left Agra, I modestly decided that there was nothing I could add to it. Here is one paragraph:

With the first sight of the Taj Mahal there comes only a [illegible] is a sudden vision, and with it a sudden sense of [illegible] lovable, and brings with it a feeling of inexpressible delight.

In a lesser degree a little shady tomb called The C[illegible] seven years of his life. At least he had the consolation of [illegible]

* * *

The Final MB candidate had been examining a young man with heart disease. "Imagine that you are his doctor: what advice would you give him?"—"Well," replied the candidate, "he ought to live within his limitations; he ought to have a nice easy job."—"Yes, but you should be more definite; what sort of a job would you advise him as suitable?" The candidate, after prolonged thought: "I think I'd suggest a government department."

* * *

I have at last discovered the drill for dealing with one's snoring fellow-men, and hasten to disclose it for the benefit of infuriated night-starved humanity. It works every time. It works with fellow subalterns with whom I am so frequently bedded down. It worked with a Brigadier—a real live Full Brigadier in Gorgeous Technicolor—with whom I shared a hayloft during an exercise. It is simply this: I say, very quietly and persuasively—"You *are* making a noise, darling," and the offender grunts "Eh? Oh, sorry Darling," rolls over and pipes down without awakening. It works *every* time.

Parliament

ON THE FLOOR OF THE HOUSE

MEDICUS MP

THIS session of Parliament is drawing to its close and in a few weeks the new session will open and a new statement of Government policy be made. The Government has not made up its mind about the Beveridge report as a whole, though definite proposals must soon be brought forward. But the Government has made up its mind that some form of comprehensive and unified medical service must come into being; what form has still to be decided. The Minister of Health has not yet issued his promised white paper on the medical services and it will probably not be published until after the new session has begun.

Whenever the war ends it is urgent that plans for the changeover to peace should now be made ready. The new session will have to make decisions about demobilisation, about the maintenance of controls, about foreign trade, and indeed about the whole business of the British Commonwealth and Empire. Most important of all, the new session will have to get down to the brass tacks of the terms of the armistice and the form of cooperation to be organised by ourselves, the USA, the USSR, China and the other United Nations to prevent aggression in the future. It is in the arena of these world-significant discussions, opened up in the last few days at Moscow, that the medical profession will have to state its case for the form of organisation through which it wishes to work in the future. Some form of a unified and comprehensive service there must be. But should it have links with all the Dominions and Colonies? Should it demand an executive as well as an advisory share in raising the level of nutrition in India, in the tropical colonies, perhaps through the International Health organisation of the League of Nations? It is the work done by the League in the past that made it possible at Hot Springs to agree on the creation of a world authority to achieve freedom from want. The new unified and comprehensive medical service should claim for itself a position on the general staff of the nation analogous to that achieved by the Army Medical Services on the military staff during this war.

FROM THE PRESS GALLERY

Soil Culture and Public Health

IN the House of Lords on Oct. 26 Lord TEVIOT called attention to food values in relation to agricultural methods in view of their importance to the health of man, animal and plant. Our hospitals, he declared, were full to overflowing, he was perturbed at the number of diseases among our farm stocks, while the diseases among our crops were legion. The cause of this tragedy, he affirmed, was to be found in food. A balanced diet was necessary, but unless the components came from a healthy soil, rich in humus, life-giving and disease-resisting properties must be deficient. Crops doped with stimulants, dressings or sprays could not impart resistance to disease. Lord Teviot asked for a royal commission or committee of inquiry. Besides representatives from the Ministries of Agriculture, Health and Food the Government should enlist the help of experts such as Sir Robert McCarrison, Dr. Lionel Picton, Sir Albert Howard and Lady Eve Balfour. The Earl of PORTSMOUTH compared the medical services and other amenities to the cart and its furniture, but food was the horse which alone can draw the cart. He thought we were in danger of getting everything arranged inside the cart, and forgetting the horse. He asked the Government to initiate a comprehensive experiment on a large block of land treated according to different methods. From that there should be built up integrated research concerned with all types of plant and animal life and human beings as a community. Such an experiment would have to cover at least twenty years, but might show strong indications within a few years.

Lord GEDDES described Dr. Enid Charles's demographic investigation on Prince Edward Island (*Canadian Journal of Economics and Political Science*, 1942, 8), which is the [illegible] social organisation of Western Europeans which [illegible] shown in the last fifty years a sharp fall in the [illegible]e. The population was living much as Lord Teviot had suggested all populations should live, drawing their food fresh from the sea and from the field. Dr. Charles had been struck by the difficulty of assigning any one influence in the observed facts as a cause, and she had worked out correlations between health [illegible] and the things which were known to [illegible] instance, taking reproduction as one [illegible] positive health, she found that with rise of income there was a fall in reproduction, with urbanisation there was a fall in reproduction, and if a large number of women were employed in any occupation that became a low-reproduction occupation. Only between a third and two-fifths in the variations in the manifestations of positive health could be accounted for, said Lord Geddes, by environment, the remaining two-thirds or three-fifths were not explained unless they had an association with the nutritional type with which the individual was by descent associated. But how far food alone was responsible for this or that population it was not possible to say without demographic examination, and also external experimentation. Lord Geddes also cited from his own experience in Northern Rhodesia an example of creative medicine. The country had been depopulated by sleeping-sickness, malaria and other tropical diseases. Since 1925 the doctors and agriculturists had turned it into a health resort. The people had been given food grown on rich humus soil with plenty of life in it, disease had been beaten back, and the positive health of these people was based on food.

Viscount BLEDISLOE urged that the time had come for research not conducted in watertight compartments on the health of plants, on the health of animals, and on the health of human beings, and some relation between the soil and all of them, but comparative research on the important problem of the inter-relation between the morbid conditions of soil, plant, animal and human being.

Lord GLENTANAR referred to proposals put forward in a memorandum by members of their Lordships' House for producing after the war a great quantity of protective foods in this country.

The Duke of NORFOLK, joint parliamentary secretary of the Ministry of Agriculture, deprecated any suggestion of antagonism between chemical fertilisers and humus. It was not a question of fertilisers versus dung, but of using both to the best advantage and in proper proportion. There was no evidence whatever from farming or medical experience, or from the scientists, that the proper and balanced use of fertilisers had any harmful effect whatever on the soil, on the health of crops or of man. The Ministry of Health were not aware of any medical evidence in support of the view that food produced from soil fertilised by artificial manures was sometimes dangerous to health. There were some soils, mostly outside Britain, deficient in certain minerals which affected the health of animals, and occasionally men who lived entirely on the produce of this particular land, but in Britain few people lived entirely off their own land.

Workmen's Compensation

In the House of Commons on Oct. 21 Mr. HERBERT MORRISON, Home Secretary, moved the second reading of the Workmen's Compensation (Temporary Increases) Bill. He said that on the ground of the change in the wages level the Government were proposing as a temporary measure, pending the introduction of a new and more comprehensive scheme, an increase in the rates of benefit. It was essential, however, that any increase should not be such as would prejudice the fair consideration by the Government and the House of the proposals in respect of workmen's compensation, and possibly about the extent of other proposals, in the Beveridge report. The Beveridge proposals were now under consideration but no final decision had yet been made. Mr. Morrison pointed out that the benefits payable under the existing acts for single men were in excess of the benefit proposed under the Beveridge scheme (35*s*. as against 24*s*.), but for the married man the standard now may fall short by 5*s*. of the Beveridge proposals. Under the new bill the allowances for a married man would be increased to 40*s*. for the first 13 weeks with an additional 10*s*. afterwards, making a total of 50*s*. The single man's compensation would be increased by 5*s*. and after the first 13 weeks to a maximum of 10*s*. The children's allowances would be increased *to 5s. a week for each child. In fatal* accidents the minimum payment, where there was an adult dependant, would be increased from £200 to £300 and the maximum from £300 to £400. The additional payments for children would also be increased up to a maximum payment of £700. It was estimated that the cost of compensation would be increased by this and the *previous bill to £17,500,000 a year, which meant an* increase of 75% since 1938. If possible it was intended that the bill should come into force on Nov. 29. The House, said Mr. Morrison, need not be apprehensive that the passage of this bill would be taken as relieving the Government in any way of arriving at an announcement of a decision on the Beveridge proposals for the per*manent revision of the system at the earliest possible* date.

tion c [illegible]

year [illegible]

substantially benefit many unfortunate victims of industrial accidents. In the debate which followed members of all parties, while accepting the Bill as a *temporary makeshift, strongly pressed the need for more* comprehensive and permanent legislation as soon as possible.

When the bill was considered in committee on Oct. 27 Mr. NESS EDWARDS proposed an amendment to clause 1 which would set aside the 13 weeks' limitation in respect of the 5*s*. and 10*s*. increase for the single and married *man respectively. As the bill stood, he declared, 92% of* the men and women injured in industry would receive no increase. Workers in Government factories, Civil Defence workers and Service men and women all received more generous terms and Mr. Edwards made a special appeal for those engaged in the hazardous work of mining. The amendment received support from members *of all parties* and Mr. D. L. LIPSON said "I hope the Home Secretary realises the strength of feeling on all sides of the committee for this amendment, No-one has spoken but Ministers in support of the attitude taken up by the Government." But Mr. MORRISON stood by the bill and the amendment was lost.

QUESTION TIME

National Health Service

SIR ERNEST GRAHAM LITTLE asked the Prime Minister whether, as the institution of a universal free health service [illegible] *promised white-paper, so that he may see what proposals are* in fact put forward in it as the basis for public discussion, before he raises the last part of the question

Tuberculosis Allowances

Mr W. F JACKSON asked the Minister of Health why tuberculous patients, who were considered hopeless cases and those suffering from non-pulmonary tuberculosis, were excluded from the benefit of the new financial allowances paid by local authorities.—Miss F HORSBRUGH replied. The special arrangements were authorised to enable persons to give up work *temporarily for treatment* which is in the interest of the public health no less than their own The association with the war effort which has been the justification [illegible] apply to such repayment from the Exchequer does not affect the power of local authorities to grant assistance within the scope of their statutory powers

Experiments with BCG Vaccines

The Agricultural Research Council, with the collaboration of the Ministry of Agriculture and Fisheries, have found sufficient herds to start the field experiments with BCG vaccine, and further herds may be included in the future *The test is one which must last over 5–6 years*, of which the present is the first It is clearly much too early to reach any conclusions (Captain J. H F MCEWEN replying to Brigadier CLIFTON BROWN)

Nurses in Factories

Replying to a question Mr GEORGE TOMLINSON said. An analysis of the registration forms received as a result of the national registration of nurses and midwives carried out on April 10 showed *that there were 8389 nurses employed* in industry, of whom 185 were men; about half the women so employed have been admitted either to the general or to one of the supplementary parts of the State Register for nurses

Divorce Decrees for Lunacy

The ATTORNEY-GENERAL informed Petty-Officer A. P. HERBERT that the numbers of decrees nisi granted in divorce cases started in London under the Matrimonial Causes Act, 1937, for the cause of insanity were as follows: in 1938, 77; in 1939, 222; in 1940, 111, in 1941, 106; in 1942, 139; in 1943 (to Oct 12), 96

Public Health

Health of London

IN spite of reductions in staff and new tasks arising out of the war, Dr. Allen Daley can report that in 1942 the peace-time work of his great and complex department continued unabated. The child population of London—and probably the adult as well—increased considerably during the year, from 148,000 in January to 220,000 in December, 1942. For all age-groups except entrants the proportion of nutritionally unsatisfactory children was lower than in 1938; for entrants [illegible] and the 1942 one 6 00. School [illegible] general cleanliness, [illegible] nits or pediculi was only 1 9 in 1942, compared with 3 0 in 1941 and 2·3 in 1938. There were 7500 less deaths but 6700 more births than in 1941. There was a gratifying fall in deaths from infectious diseases, diphtheria causing only *51 deaths in 1942 compared with 82 in the previous year*; scarlet fever has almost ceased to be a cause of death—it killed only one person in 1942. Notifications of [illegible] when the [illegible] that the [illegible] has been checked. The neonatal mortality fell from 25 4 per 1000 live births in 1941 to 24 7 in 1942, and the infant mortality from 57 to 50; these rates are much better than they were at the corresponding period of the last war, but have yet to reach their prewar best. Maternal mortality fell in the year from *3 05 to 2 51, but the rates for* 1940 and 1939—1 98 and 1·97—remove any grounds for complacency. [illegible] omen attending the venerea[illegible]st time, both with syphilis [illegible] clinics deal mainly with civilians, whose numbers are falling, and many cases of gonorrhœa are now treated by private doctors instead of at the public clinics because sulphonamide treatment is comparatively simple to carry out; Dr Allen Daley says there is little doubt that the incidence-rate is increasing

Infectious Disease in England and Wales

WEEK ENDED OCT. 23

[illegible] easles (excluding rubella), [illegible]; pneumonia (primary or influenzal), 579; puerperal pyrexia, 158; cerebrospinal fever, 16; poliomyelitis, 13; polio-encephalitis, 0; encephalitis lethargica, 0; dysentery, 210; ophthalmia neonatorum, 91. No case of cholera, plague or typhus fever was notified during the week.

The number of civilian and service sick in the Infectious Hospitals of the London County Council on Oct 20 was 1972. During the previous week the following cases were admitted: scarlet fever, 229, *diphtheria*, 36, *measles*, 18; *whooping-cough*, 36.

Deaths—In 126 great towns there were no deaths from enteric fever, 1 (1) from measles, 1 (0) from scarlet fever, 13 (1) [illegible] from diphtheria, 51 (6) from [illegible] two years, and 13 (1) from [illegible] parentheses are those for London itself.

[illegible] ch reported 4 deaths from diarrhœa. [illegible] notified during the week was [illegible] rate of 32 per thousand total [illegible] ndon.

Letters to the Editor

FULL-TIME SERVICE

SIR,—In his *Instincts of the Herd in Peace and War* Wilfred Trotter wrote :—

> "Man is intolerant and fearful of solitude, physical or mental. This intolerance is the cause of the mental fixity and intellectual incuriousness which, to a remarkable degree for an animal with so capacious a brain, he constantly displays. As is well known, the resistance to a new idea is always primarily a matter of prejudice, the development of intellectual objections, just or otherwise. being a secondary process in spite of the common delusion to the contrary."

If he had been seeking an illustration in support of this thesis, he could hardly have found a better one than the reaction of the profession to the introduction of the National Health Insurance Act, 1911. After such a warning we ought to be on our guard lest once again we are carried away by instinct, and we must do our best to distinguish in our minds between prejudice and logic. This is by no means easy but if we recognise that we are by nature instinctively prone to prejudice against new ideas, we are in a position to make some allowance accordingly.

Probably no medico-political problem is, or has been, of greater moment than whether we, as general practitioners and consultants, should be prepared to accept service as whole-time employees of the state, in the reconstitution of the medical services of the country which must inevitably take place after the war is over. If we accept whole-time service we must also accept a salary, which will be fixed in accordance with our particular duties, and which we will not be able to supplement by fees. There is, therefore, no need to discuss the question of salary and whole-time service as separate items.

On looking through the reports of the various assemblies and committees which have discussed the problem one can distinguish two fairly well-defined objections to a whole-time service. First it is said that under a whole-time service the free choice of a doctor by the patient would fade or disappear entirely. If this were true it would be a strong objection, but the reasons are not very apparent. Secondly, against a salaried service is set the fact that, in general, people tend to value what they pay for on the spot more highly than that which comes to them free, or for which they have paid in an indirect manner by insurance or taxation. No-one who has practised for any length of time, whether as a family doctor or consultant, can doubt that this is very often true.

Besides these two main lines of opposition there are many more personal and individual objections to whole-time service. There is no doubt that many doctors do not want to be bound in any way as servants of the state. They like to be financially independent, to see their practices grow, and to feel that they are beholden to no-one but their own good work for their success. Under any salaried scheme it is difficult to see how advancement can come in the same way directly as a result of individual effort. Promotion is bound to wait on vacancies and the selection of an appointments' committee. Again many have had experience in the fighting services, where so many things must be put up to higher authority through the "usual channels," and know only too well how sluggish the stream in these channels can be. They therefore distrust bureaucratic control in any form, believing that it hampers and stifles individual initiative and freedom, both of thought and action.

Rightly or wrongly, there is also a fear that the conditions of service will be unsatisfactory. Admittedly none have as yet been laid down in any detail, but most of us can recall the necessity to black-list certain local authorities because they cut the rates of pay for some of their medical officers below the BMA minimum, and such memories die hard. Some will have unhappy experience with regional medical officers at whose inspections attention is focused primarily on the notes and records and little, if at all. on how the patients are getting on. Others again will have seen medical officers employed under local authority obstructed or favoured in their work by questions of party politics or the per- [illegible] orances or prejudices, likes and dislikes. of [illegible] and even of their families.

How far are these considerations "matters of prejudice" and how far are they "intellectual considerations, just or otherwise ?" It is extraordinarily hard to decide, and probably each of us will have his own particular shade of opinion. There is no doubt they are very real, and must be taken into account in drawing up plans for any state service that is to turn out a success. Probably the argument that a state scheme would interfere with a patient's free choice of doctor is unsound. Under the National Health Insurance Act patients are free to choose their doctor, and there is no clear reason why they should not be equally free under any other state scheme. In any event the majority of the population is already limited to a choice between very few alternatives by purely geographical considerations. The choice of a consultant is even more limited. The patient will see either the only man in this district who specialises in his particular complaint, the specialist who happens to be holding a clinic on the day he is referred to hospital, or the consultant chosen for him by his family doctor. Few will make an entirely independent choice on sound lines. We all know the patient who likes to talk of "my man in Harley Street." or who goes seeking special advice guided in his choice by his lay friends rather than by his doctor, and not infrequently finds himself on the road to Endor.

The BMA give their answer to the difficulty in Recommendation I. They recommend that everyone shall be free to consult either the doctor he has selected under an official service, or privately for a fee any other doctor, whether a member of an official service or not. By no means everyone will agree that such a plan is either wise or ethical. It is intended so to avoid the splitting of the profession into two groups, the official and non-official. I can imagine, however, that it might cause far more embittered relationships between colleagues than the fact that one preferred to practise on his own and the other to serve whole-time in a state scheme. I have noticed no particular hostility between private practitioners and those who serve as medical officers of health or whole-time in hospitals or universities. On the other hand there is the question how far it is fair to allow doctors employed by the state to supplement their salaries by attending their colleagues' patients for a fee. To do so might well lay them open to temptation and ill-disposed criticism.

The argument that people will not value advice which they have not paid for directly probably only applies to a minority. The great majority of panel patients value the advice of their doctors, and there is a steadily increasing demand for the specialist services supplied by hospitals, where the payment, if any, is commonly made indirectly through a contributory scheme, or is purely nominal if the patient is very poor. Ratepayers are not backward in demanding treatment in municipal hospitals and clinics, and consultants in charge of outpatient departments cannot fail to be struck by the high proportion of patients they see there who could very well have afforded to pay a fee in private. It may be that they put less value on the advice they get when it is given for nothing, but they certainly seem to prefer it so.

Probably therefore on principle there is nothing against a whole-time salaried service, though there will certainly be a proportion both of patients and doctors who can never wish to restrict themselves within the limits of a state scheme. It is healthy and right that this should be. An all-embracing government service from which there was no escape or alternative for either doctor or patient would soon become infected with all those faults characteristic of institutions which have no stimulating opposition to keep them progressive and vigorous. By all means, therefore, let there be a section of the profession entirely outside the state scheme and engaged in private practice. They can be sure of a following, and their success or otherwise will be a direct indication of the efficiency and popularity of the state service. There need be no disastrous split in the profession provided a fair and reasonably easy method is devised whereby doctors can pass from one form of practice to the other. The details of such a method are entirely financial, and are some of the first that must be worked out if medical officers from the Services are to be attracted into the state scheme when they are demobilised ; for many of them will have their savings locked up in the goodwill value of their practices and in their houses and surgeries. Fair compensation must be given for these.

If the state is to attract the best in the profession it must find a solution to these problems, and lay down conditions of work and organisation which appeal to the profession as a whole. Only so can it hope to establish a fully efficient service; and nothing less than this will satisfy the country. The difficulties are not of principle but of method and detail, and I hope and believe that a solution can be found for them on a basis of a whole-time salaried service.

W. A. LISTER.

CONDITIONS OF MEDICAL SERVICE

SIR,—In your issue of Oct. 23 a group of correspondents say that "the salary of the specialist should not be higher than that attainable by the general practitioner by virtue of experience or higher qualifications." If this means that all doctors in the new state service are to be paid alike, regardless of whether they are consultants or general practitioners, many of us will protest. All consultants hold higher qualifications and these should carry higher rates of pay.

I would suggest a basic pay for all. To this should be added allowances for (*a*) each extra diploma and (*b*) length of service. It might very properly be objected that it is more difficult to be a good general practitioner than a good consultant, but that few GPs desire to take a higher diploma (except perhaps MD) and so in fact would draw less pay than their colleagues in consulting practice with their many diplomas. Is it rash to suggest that a new diploma be instituted—a DGP (diploma in general practice)? Or even a fourth Royal College—a *RCGP*?

Queen Anne Street, W.1. C. ELGOOD.

GOING UNDERGROUND

SIR,—Dr. Millais Culpin, in his important letter in your issue of Sept. 25, raises the whole problem of the wrong and the right way *of handling neurosis, whether* of the individual or the mass variety as seen in industrial disputes. He illustrates from how small a beginning deep unrest may spring. Such knowledge cannot be too widely disseminated in time of war when stoppages of all sorts are catastrophic. Troubles are more liable to occur in war-time when the necessary deprivations and restrictions that accompany it cause men's tempers to become frayed. The present rough-and-ready methods of handling disputes are to be deprecated together with the unfortunate tendency on the part of authority, whether such be medical or lay, to ignore the psychological *side of things and try to push ahead* blindly with production. In their stead should be introduced a realistic and humanitarian approach to such matters. Were this to come about we should all be the happier, individually and collectively, not to mention the speeding up in production that would ensue.

As Dr. Culpin says, the case of the lad Page illustrates the wrong way to handle such problems. One who suffers from a fear of confined spaces should not be
treated, without inquiry,
and forced to go down a p ,
doing so. *In his case, it is stated that his fears had* recently been reinforced by the sight of an older man brought up mangled from below. A difficult psychological relationship between son and father appears to lie behind such fear reactions and would need to be resolved by the state before it is entitled to ask him to become a miner.

Consciously or unconsciously, the miners recognise this fact and protest against Page's imprisonment, and the mishandling of his case by authority, in the only way that they know—by striking. To punish them in their turn is still more short-sighted and can only lead to widespread disaffection.

There is too great a tendency for the lay mind to accuse the psychologist of "spoiling the child" when he advocates removal of the individual from the source of his fears.

In industry generally, a strike threat is always the culminating sign of smouldering unrest—a protest on the part of the employee against some injustice that rankles, of which he may or may not be consciously aware. Unless this is investigated and put right, the danger of mass neurosis arises: reprisal measures can only make matters worse. The assumption by the employer or medical board of an attitude of omniscience *and infallibility can lead nowhere. The employer and* doctor, by reason of their own inner anxieties, are frequently possessed themselves of a psychological blind spot, and so are often unable to see or comprehend the underlying causes of unrest, due in the last instance to difficult environmental factors.

No man in his senses would expect his car to go forward when grit has got into the carburettor; common sense would teach him first to extract the grit. If the wheels of industry are to continue to revolve smoothly an exhaustive inquiry should be made into all the circumstances directly any tendency to a slowing down of effort manifests itself. A board should be constituted, comprising representatives both of employers and employees, assisted by a competent psychologist with experience of industrial disputes. The psychologist is needed because his eye is specially trained to observe such matters and his therapeutic technique is devised to get rid of friction.

Harley Street, W.1. CYRIL WILSON.

THROMBOCYTOPENIC PURPURA

SIR,—We have read with much interest Mr. Rodney Maingot's letter of Oct. 23. We have available the weights of the spleen in some of our cases. They are as follows:—

Removed at operation				Removed at necropsy			
Males		*Females*		*Males*		*Females*	
Age	Weight	Age	Weight	Age	Weight	Age	Weight
10	2¼ oz.	4	3¼ oz.	19	5¼ oz.	28	5¼ oz.
13	8 oz.	19	10¼ oz.	11	2 oz.	32	9 oz.
13	6 oz.	34	2¼ oz	46	9¼ oz.	40	6 oz.
3	1¼ oz.	46	5¼ oz.	..	..	54	8 oz.
23	1 lb. 7 oz.	44	1 lb. 2 oz.	..	..	69	4¼ oz.
						56	4 oz.

The two patients with the largest spleens (1 lb. 7 oz. and 1 lb. 2 oz.) were cured by splenectomy; the third largest had splenculi, and her symptoms persisted. There is no doubt about unremoved splenculi being a factor in relapse following splenectomy: but we have no evidence, either operative or necropsy, of splenculi being present in cases in our series apart from the ones we mentioned.

HORACE EVANS.
London Hospital, E.1. KENNETH M. A. PERRY.

THE CARIES-FREE MOUTH

SIR,—At medical inspections of 541 children of different age-groups drawn from 15 schools in South London I made a careful search for and inquiries about caries-free mouths; 6% of the children were caries-free, by which is meant, no caries present before or at the time of examination.

Of the 5 to 6 age-group, 13% were caries-free.
" 7 to 8 " 2·2%
" 9 to 10 " 6%
" 11 to 12 " 5%
" 13 to 14 " 2%

I have no statistics for comparison but I believe these figures are an improvement on previous findings, and I submit them not for their intrinsic value, if any, but merely to call attention to the need for an inquiry into the reasons for this freedom from caries. Mellanby has shown that caries can be arrested and often prevented, but we still do not know why some children who eat what they like or what they can get have caries-free mouths. From a survey of my detailed notes I can do no more than form the impression that milk and/or cod-liver oil in adequate quantities, or the ability to tan, limit or prevent carious invasion, thus confirming in a haphazard way Mellanby's findings. In the older caries-free children the presence of tar

It may well be t
facture or absorb
but at this stage it is wiser to make
would urge, however, that the

mouths by a team of dental surgeons, biochemists, dietitians and social workers might produce far-reaching results and do more to offset the shortage of dentists than schemes for increasing the supply. It would, I feel sure, prove the soundness of Professor Ryle's constant appeal that the study of the healthy should keep pace with the study of the unfit.

Blackheath. GUY NEELY.

LEUCOCYTE COUNTS IN RADIUM WORKERS

SIR,—In your issue of Sept. 4 (p. 289) Dr. C. J. C. Britton drew attention to a low level of leucocyte counts occurring among healthy nurses of the Middlesex Hospital, not exposed to radium. I have also noticed this among nurses at Mount Vernon, and among normal young males beginning radium work and not connected with any hospital. It seems likely that this is a war-time effect, worth the while of some public body like the Ministry of Health to investigate, to see how far it extends in the population, and to seek its cause.

It is to be noted in Britton's counts that whereas 20·1% were below the level of 3000 polymorphs per c.mm., only 8·1% were below the level of 1500 lymphocytes. Thus the lymphocytes are much less effected. So by discarding the polymorph count and relying on the lymphocyte, it remains possible to rely upon blood-counts to determine whether workers should or should not continue handling X rays and radium. Several radium workers under my care have recently shown progressive falls in polymorph counts not accompanied by lymphocyte falls, and have been permitted to continue with their work.

I do not agree with Britton that weekly counts would solve the difficulty. Among radium workers the fall in leucocytes is to be detected not in weeks but in months or years, and could not thus be distinguished from the war-time effect to which he draws attention.

Mount Vernon Hospital, Northwood. J. C. MOTTRAM.

THE SIZE OF INFLUENZA A VIRUS

SIR,—Dr. Kenneth Smith's letter in your issue of Oct. 23 prompts me to mention briefly some experiments conducted, in collaboration with the late Miss Dora Lush, soon after American workers first intimated that they regarded the true size of influenza virus to be about 15 mμ. This figure was the outcome of studies with the virus propagated in 10-day-old hens' eggs, whereas earlier work with the virus obtained from the lungs of flu-infected mice had indicated a particle size 80–100 mμ. We accordingly analysed allantoic and amniotic fluids from eggs infected with influenza A virus, employing the methods of ultrafiltration and centrifugation. During the limited attention we could devote to the problem at that time, no evidence was found for the existence of the extremely small phase of the virus. Likewise, virus that had been precipitated with salmine and re-dispersed showed the same order of size as virus before such treatment.

It should also be mentioned that Friedewald and Pickles (*Proc. Soc. exp. Biol. Med.* 1943, **52**, 261) have recently reported having submitted influenza-infected allantoic fluid to centrifugation analysis, and, following a different technique from our own, find the size of the virus to be at least 60 mμ. Our values by two alternative centrifugation methods ranged from 60 to 90 mμ.

In my opinion, you were wholly justified in your criticism of the hasty acceptance of the small figure for the size of influenza virus by Dr. Smith in his generally admirable booklet *Beyond the Microscope*.

National Institute for
Medical Research, N.W.3. W. J. ELFORD.

*** Current opinion as to the size of viruses is based upon the results of differential filtration through graded collodion membranes, centrifugation and at times optical methods; data so obtained by these three methods have on the whole yielded concordant results. Chambers and Henle have recently thrown doubt on the conclusions thus reached as to the size of influenza virus. The exact size of this virus is in itself relatively unimportant, but their claims, if correct, throw doubt on most of what is cepted as to the sizes of viruses in general. The e, however, not yet carried general conviction, y in this country.—ED. L.

HIPPURIC-ACID EXCRETION AND URINE VOLUME

SIR,—In your issue of Oct. 16 Major Allan Palmer, confirming the findings of Machella et al., reports a positive correlation between the amount of hippuric acid (HA) excretion and urine volume, using Quick's intravenous modification of the test. This was evident particularly in tests where the urine volume was below 150 c.cm. and he concludes that abnormally low HA values obtained in a urine volume below 150 c.cm. may be inaccurate. This conclusion, on the evidence presented, is open to criticism. It is a well-established fact,[1] not mentioned by either investigator, that patients with hepatic disturbances have a tendency to delayed excretion of water and oliguria. One would expect, therefore, to find a tendency to low urine volumes in association with low excretion of HA, both presumably being related to the same underlying disorder.

In my experience with the intravenous modification of the test, using Weichselbaum and Probstein's (1939) analytical technique, and giving 200 c.cm. of water at the time of the injection (as is recommended by Dr. Palmer), many patients and normals show "normal" and even "optimal" excretion of HA in the first hour despite urine volumes below 150 c.cm. and even below 100 c.cm. To consider a subnormal output of HA in a "low" urine volume as "inaccurate" seems to me objectionable, since the frequent association of low urine volumes with low HA output does not necessarily imply that the one directly causes the other. In fact, while I find, on plotting excretion of HA against volume in some 180 tests, a certain tendency for the low HA values to be associated with low urine volumes, the correlation is not strict. In follow-up studies with serial tests in individual patients the lack of correlation is striking, and it becomes clear that a large urine volume need not cause an increase in the output of HA or vice versa. To illustrate this may I quote the following data from five patients with gastric ulcer:

Case	Date in 1943	HA excretion (g. sodium benzoate)	Urine volume (c.cm.)	Case	Date in 1943	HA excretion (g. sodium benzoate)	Urine volume (c.cm.)
1	Feb. 15	0·76	208	4	June 1	1·02	240
	,, 18	0·74	134		,, 8	1·04	250
	,, 23	0·82	95		,, 11*	0·71	285
					,, 13	0·89	140
2	March 25	0·67	130		,, 15	1·06	87
	,, 28	0·78	580		,, 18	1·07	95
	,, 31	1·04	135		,, 23	0·94	245
	April 5	1·30	150		,, 27	0·99	265
				5	April 7	0·44	195
3	Oct. 8	0·62	155		,, 17	0·56	60
	,, 12	0·56	46		,, 19	0·67	164
	,, 16	0·54	40		,, 27	0·64	320
	,, 20	0·57	70		,, 6	0·72	175

* Post-op.

The observation of Machella et al. that induction of diuresis by say 1000 c.cm. of water before the test may increase the output of HA, requires closer study since no account was taken of possible spontaneous day-to-day variations in an upward direction. H. POLLAK.

NOT SO DREARY

SIR,—The conditions of service in the municipal hospitals controlled by the Middlesex County Council are admittedly excellent, but by no stretch of imagination can they be considered representative of the conditions prevailing in municipal hospitals throughout the country. The rateable value of the county of Middlesex is the highest in the world; therefore considerably more money is available for hospital development.

In the majority of municipal hospitals the position of the senior members of the staff has deteriorated steadily since the outbreak of war and now compares very unfavourably with the position of the majority of general practitioners.

I do not propose to waste space by going through the list of amenities mentioned in the letter of Dr. Avery Jones in your issue of Oct. 23, but I can safely say that in the average municipal hospital not one of them would be found to exist. ASSISTANT MEDICAL OFFICER.

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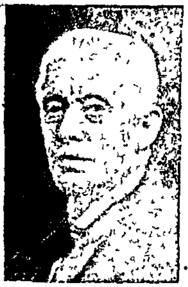
[1] Adler, A. *Klin. Wschr.* 1923, **2**, 1980; Adlersberg, D. *Wien. Arch. inn. Med.* 1934, **25**, 269.

Obituary

CHARLES JOHN MACALISTER

M D EDIN., F R C P, T D

Dr. C. J. Macalister was for many years a notable figure in the social and medical life of Liverpool. Son *of the ship-owner William John Macalister he was born* and educated in the city for his father's calling, but persisting in his preference for medicine went to Edinburgh for his medical course, which he completed in 1884. Returning to Liverpool he married a daughter of Dr. William Carter, at that time senior physician to the Royal Southern Hospital, a position to which Macalister in due course succeeded, holding it until 1925. Throughout this long tenure he was associated with Robert Jones and Thurstan Holland, the radiologist, and *on terms of close friendship* with both. Macalister was attracted to the problems of what is now coming to be called child health, and from quite an early period of his career he and Robert Jones saw the importance of treating city children in country surroundings, both with a view to prevention of disease and its cure when that implied a long period of hospitalisation. Out of this arose the hospital at Heswall, now incorporated in the Royal Liverpool Children's Hospital. In many other directions Macalister's active mind was constantly feeling out for the solution of fundamental problems in the origin and treatment of disease. He was one of the earliest to recognise the value of ultraviolet therapy. He also worked for long at the stimulation of healing of wounds and (with Benjamin Moore) at the possibility of anti-neoplastic factors in the embryo and young infant. He may not have had spectacular success in either of these difficult fields, but undoubtedly his questing mind was a stimulus *to his fellow workers. Intense loyalty to* the hospital which was his professional home led him to compile, and publish in 1936, its *Origin and History*, a [illegible] raits and personal [illegible] own share except [illegible] ed children's outpatients and prompted the rebuilding of the pathological department. Macalister made friends with apparent ease in many different spheres. For this no doubt he had to thank his gracious personality, his *kindliness of nature, and the social charm and humour* which unfailingly drew about himself any group in which he moved. In the early years of the last war he married his second wife, Miss Leslie Stalker. There were two daughters of this marriage, of whom the elder qualified last year and was house-surgeon at the Royal Southern. Although his health had been failing for some time *and he had been living in retirement at Bourton-on-the-*Water, the loss of such a vivid personality will be widely felt. He died there on Oct. 25.



From a portrait by Frank T. Copnall

WILLIAM ROLLAND

M D GLASG.

Dr. William Rolland, physician and pathologist to the [illegible]

and then [illegible] Royal Infirmary in 1911 at once started a one-room laboratory at the hospital. Today the department of pathology is housed there in up-to-date laboratories. Rolland also worked hard as a physician to the hospital and proved himself a careful and conscientious clinican. He was interested in diseases of the chest and published *papers on acute pulmonary* œdema and on *purulent* bronchitis in our columns. But his real enthusiasm was for pathology, and especially bacteriology. During the last war he served in France as bacteriologist to the 24th General Hospital, BEF.

Dr. Rolland leaves a wife and a son, who is a medical student in his final year. A younger son was lately killed on active service with the RAF.

JOHN HAROLD BEDLINGTON ROUND

M B CAMB.; CAPTAIN RAMC

NEWS *has been received of the death in Persia of Captain J. H. B. Round at the age of 30 from nephritis.* He was the only son of Mr. and Mrs. Harold Round of Edgbaston, Birmingham, and was educated at West House School, Greshams, and Pembroke College, Cambridge, where he was secretary to the Cambridge Medical Society. He won an entrance scholarship to Westminster Hospital and after graduating in 1936 he served as house-physician to Sir Stanley Woodwark. Round returned to Birmingham as the first medical officer of an aero factory to organise the medical services. Later he became medical officer of a group of factories in the Midlands and held this position until he joined the RAMC in August, 1911. In November, 1942, he was posted to Persia and served there till his death. His great hobby was motoring and he had taken part in many reliability trials. He married Miss Brenda Johns of Putney.

GEORGE ERIC CAMPBELL PRITCHARD

M D OXFD, F R C P

Dr. Eric Pritchard died at Exmouth on Oct. 20 in his 78th year. *With his death the pædiatricians* of this and other countries lament a good friend; more than that, the children of the British Isles have lost one of their traditional champions.

He was a link, writes D. P., between the voluntary hospital pædiatrician and the public health pædiatric service. No-one who worked with him at the Infants Hospital in Vincent Square could help but be impressed by the number of ailing infants sent for his advice by welfare officers from all over the country who had supreme confidence in his ability to help them and solve their problems. He was not only a pioneer in infant feeding, but his views were often so far in advance of current teaching that they failed to command the attention *and respect which they after*wards proved they deserved.

In his recognition of the vitamins he was 20 years ahead of the times. Looking back, one can say with *assurance that he was the first pædiatrician in this* country to appreciate the fact that infant feeding was more closely related to the weight than the age of an infant and the phrase "expected weight" was one which he coined himself. To hear him question a mother as to how she fed her infant, how often, how she made up the feed and administered it, and then point out to his students where the fault lay was to realise that he was a master of the subject, and his directions to the mother on the method of handling, managing and feeding her infant were those of an artist. His outlook was wide and his influence on the preservation of good health in *infancy* [illegible] classes of welfare workers [illegible] both at Vincent Square [illegible] national associations at [illegible] he would discuss the weekly weighing of infants, the value of breast feeding, the virtues of dried milk versus fresh milk, fruit juice, cod-liver oil and other vitamins, the shortage of calories and the technique of the infant's care. He made the whole [illegible]; it has been said that he [illegible] association with the fly [illegible] thing of science and art. Of several widely read books through which his teaching took effect the *Physiological Feeding of Infants* was the most ambitious. He had advanced ideas on the teaching and training of midwives in their care of the new-born and when appointed to Queen Charlotte's as their first pædiatrician, he revolutionised the care of the infant in that great maternity hospital. His views on children's diseases were less orthodox.

George Eric Campbell was one of the gifted family of Charles Pritchard, DD, Savilian professor of astronomy at Oxford, to whose early training he owed his habit of exact thought and organising ability. He did well at Clifton College before entering Hertford College, Oxford, where he took honours in physiology, pursuing this study at Berlin in vacations, and he qualified from St. Mary's, Paddington, in 1892. After house appointments there and some experience of general practice in South Kensington he found his bent as physician to the St. Marylebone General Dispensary, where he initiated the first infant welfare-clinic in London. At this time he was also on the staff of the Queen's and outpatient physician to the City of London Hospital. From 1922 to 35 he was medical director of the Infants Hospital in Vincent Square and later was attached as pædiatrician to Queen Charlotte's. In 1934 he was president of the British Pædiatric Association. All his medical work was firmly based on physiological principles and it was radiant health that appealed to him, whether in the glossy coats of the cairn terriers which he reared or in the firm flesh and rosy colour of the countless babies who owed him their lives. It was noteworthy that while he was rather strict with the mothers their children regarded him without alarm. He had a certain Puckish humour and could on occasion use a caustic wit. Those who played games with him—and he took them mighty seriously—might miss the kindlier side of his nature which was turned more to the nurses, health visitors and helpers at clinics, many of whom (including the staff of the Wellgarth training college) combined a deep affection for him with complete trust in his skill. But colleagues who got beneath his rather-shy exterior found a heart of gold. At home he was the perfect host, full of anecdotes. He was a keen gardener, spending week-ends planning and cultivating the garden at Burnham Beeches around his country home that was to be. His wife's failing health, however, led him to retirement at Exmouth, where the tedium of his last illness was mitigated by the companionship of his sisters, Lady (Bretland) Farmer and Lady Chalmers Mitchell.

LEOPOLD HERBERT

M D BELF; CAPTAIN RAMC

Captain Leopold Herbert was killed on active service in Sicily when a shell landed directly on top of his regimental aid-post. He was born at Lurgan in 1912, the son of Mr. Abraham Herbert, and educated at the Belfast Royal Academical Institution. He graduated in medicine from Queen's University, Belfast, taking his MD four years later. After qualification he held a house-appointment at the Guest Hospital, Dudley, later becoming assistant medical officer at St. Stephen's Hospital (LCC) and senior assistant medical officer at the Beverley Road Hospital, Hull. Prof. W. W. D. Thomson, under whom he worked in Belfast, writes: Leo Herbert's pleasant smile and cheery face, his keen interest and spontaneous enthusiasm in all his work marked him out in the ward or classroom. After he qualified he retained the student habit, and on his return to Belfast while houseman in English hospitals he never failed to pay a visit to his home hospital to discuss some case which had been of special interest or had presented some puzzling feature.

Herbert joined up at once on the outbreak of war and had seen service in many parts of the world. He was on board a troopship taking part in the evacuation of Singapore and went through the last North African campaign as a regimental medical officer. His commanding officer writes of him as a "cheerful, useful, brave and efficient" doctor who could be relied on to do excellent cal work no matter how difficult the circum-

Notes and News

MEDICINE AND INDUSTRY

A STRONG case is needed to justify producing a new journal at this stage of the war. Such a case is forthcoming for the *British Journal of Industrial Medicine* which is to be published quarterly, from next January, by the British Medical Association. Industrial medicine has gained in immediate importance in the past four years; yet its exponents still have no journal in this country devoted to their problems. The Association of Industrial Medical Officers has been keenly aware of the need and the opportunity, and the new journal, besides printing 'original work, abstracts and reviews' will record the proceedings of the association and its component groups.

Sir Henry Bashford has been giving much time to the new venture, but his appointment to the Treasury, recorded on another page, now prevents him from being editor-in-chief. It is anticipated that Dr. Donald Hunter will take his place, the other editors being Dr. A. J. Amor, Sir Henry Bashford, Dr. M. W. Goldblatt, Dr. D. C. Norris, Dr. Donald Stewart and Mr. R. W. Watson-Jones, assisted by an editorial board comprising Lieut.-Colonel G. S. Parkinson, Dr. J. C. Bridge, Lieut.-Colonel G. P. Crowden, Professor Millais Culpin, Sir Arthur Hall, Dr. D'Arcy Hart, Sir Wilson Jameson, Dr. R. E. Lane, Dr. E. R. A. Merewether, Air Vice-Marshal Sir David Munro, Dr. R. S. F. Schilling, Dr. E. H. Strange, Dr. H. M. Vernon and the Editor of the *British Medical Journal*.

COMMUNAL FEEDING

THE first attempt to take stock of the position of civic or communal restaurants has recently been undertaken by a research group of the London Council of Social Service,[1] under the direction of Mr. F. Le Gros Clark. Out of some 2000 of these restaurants, spread unevenly through the country by the spring of 1943, 281 were within the London area, 46 of them directed by voluntary committees. The council chose for their survey 41 of the voluntarily conducted restaurants; and 1220 customers (about 10% of the clientele) answered a series of questions directed to ascertain how far the restaurants have a permanent value apart from their use as a war-time measure. About 85% of the diners, it seems, were regular customers, representative of adults of all ages and both sexes, with a growing proportion of office and professional workers. A considerable number of the women now go out to work for the first time, and were formerly in the habit of taking their meals at home. About 27% of the clientele had previously taken sandwiches to work with them, and the report says that there must be at least 200,000 people in the country as a whole who are saved from the monotony of a carried lunch by the civic restaurant service. Some 40% formerly lunched in commercial restaurants or cafés, a fair proportion of which have closed since 1940, the communal restaurants probably doing little beyond filling the gap. Meals for aged people, many of them old-age pensioners, are provided at a reduced price, several of the restaurants allotting a special table or a special time to the pensioners. These old people welcome a hot meal served by a considerate staff and taken in company with their neighbours, instead of a lonely snack in a single room. Nearly all the diners expressed a wish that the restaurants should continue after the war, reasons for appreciation varying from convenience, comfort, quick service, cheapness, cleanliness, lack of class distinction, to pleasure, often expressed, at the quality of the food served. The most popular dish was meat, though a growing taste for salad dishes was found in several restaurants. The atmosphere is democratic and homely, and the meals are selected by people with an eye to the dietetic interests of their customers.

If some similar provision is to be carried on after the war, the restaurants must obviously be able to pay their way. The investigators discovered that the determining factor in financial success is the turnover, the lowest annual turnover sure of showing a favourable balance being £3000. Premises are also important: most of the restaurants are now in premises which will revert to their original owners—church halls, shops, private houses, club buildings and the like. It seems probable that special premises designed for the purpose would have to be established, and this contingency should be faced in good time.

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[1] The Communal Restaurant. From the secretary, 7, Bayley Street, London, W.C. 1. Pp. 36. 6d.

Royal College of Physicians of London

At a comitia of the college held on Oct. 28, with Lord Moran, the president, in the chair, Dr. John Parkinson, Dr. George Riddoch, Dr. Henry Cohen and Dr Janet Vaughan were elected councillors. Dr. C. M Hinds Howell was elected representative on the committee of management of the Conjoint Board, Sir Comyns Berkeley on the council of the Central Midwives, Board, and Dr. Otto May on the British Social Hygiene Council Sir Edmund Spriggs was appointed Harveian orator and Dr C Bruce Perry Bradshaw lecturer for 1944, and Dr. H. Stanley Banks Milroy lecturer for 1945 The Jenks scholarship was awarded to D G M Hills, late of Epsom College

The following were admitted to the membership:

Bastible, MD NUI,
MB LOND, P. J
D M Dunlop
aral, LRCP, Louis
H. Helm, LRCP
H A Leggett
MD VIENNA, LRCP,
SC EDIN, surgeon
squadron-leader
RAF and David Weitzman, MB LOND

Licences to practise were conferred upon the following 107 candidates (173 men and 24 women) who have passed the final examination of the conjoint board and have complied with the by-laws of the college

A. R. Anderson P R Apperly, P G Arblaster, P E Baldry, M. A. Basker, K H Bassett J S Battersby, W O H Bell S B Bennett, W E J Bennett Leonard Bernstock, G E R Bibbings, H. R. Blades, R A Blyth L S A Boothroyd, M P. Bourke, W. M. de C. Boxall R S Bradbrool P R Bromage, V. S Brookes, D. H. Broughton, A E Brown, W F Buchanan, Dora Buckley, R. R. Burn, Dennis Canter A H D Capper, Eileen M Carey,
P A H Clements, E R Cole,
Crow, S M. F. Curé, M J.
A Dean, E W. Deane, Frank
W Dodd, M C H Dodgson,
D Dutton, J R Dyer, O. G
erker, Lionel Erin, Maurice
Evans, R H J Fanthorpe,
S. C. Farman,

ancy, I. S Harlow, A D
eptinstall, A J H Hewer,
ay, J. C S Holmes, J. W
arth Lilian Howell, R A
. F. Jackson, H. B. Jacobs,

Ziervogel.

with the Royal
in our issue of

Prize in Anatomy

to
de
group of their relations and friends have now endowed a prize in their memory. The Waddington prize will take the form of books presented to the most promising student in the junior anatomy class

Food Education Society

At 3 PM on Monday, Nov. 15, at the London School of Hygiene, Keppel Street, W.C.1, Prof. J. R Marrack is to give a lecture on food and the postwar world.

Medical Society of London

At 4.30 PM, on Monday, Nov. 8, the society will meet at 11, Chandos Street, W.1, to discuss surgery of the nerve gap. Prof. H J. Seddon is to be the opening speaker.

University of London

The faculty of medicine have elected Mr J. B. Hunter to be their dean for the remainder of the period 1942–44 in place of Sir Girling Ball who has resigned.

University of Glasgow

On Oct 23 the following degrees were conferred:

M.D.—Gilbert Forbes (with high commendation), G G Robertson (with commendation), I S McGregor and Elizabeth A. Marshall.

M.B., B Ch—D M Mackay, R C Curran, William Phillips, R. S Duff, Charles Brown, May B Paterson, W. M Lancaster. T. D V. Lawrie, J C C Kell
M O Anderson, J A

Agnes
Hamilton Currie Tho
Forbes, May C Forbes
Samuel Galbraith, J Hargrave,

A Wylie and Nora Yates

Scottish Conjoint Board

At recent examinations of the board of the Royal Colleges of Physicians and Surgeons of Edinburgh and the Royal Faculty of Physicians and Surgeons of Glasgow, the following were successful:

LRCP & SE, LRFP & S

A. C Austin, F St M Brett, E D Cameron Margaret R Connolly, M C Fitch, Ernst Frischler, Ellis Glekin, Elizabeth G Hood, J. G. Levack, I M. Lourie, S R Mardj, J W Muggoch, D. J P. Naismith, Elizabeth R. B Polland, J F. Richardson, Frances Selesnick, A M. Shokry, H. M Steel, and A D Willox.

The following graduates of recognised foreign universities were also admitted to the licentiateship:

Karl Friedmann, MD Vienna, G W. Green, MD, Brux, Ruth Meier Blaauw, MD, Breslau, and G M. Weiss, MD, Bologna.

Royal College of Obstetricians and Gynæcologists

At a meeting of the council on Oct. 23, with the president, Sir William Fletcher Shaw, in the chair, Prof J. J. Kearney was elected to the membership. The following were also admitted to the membership J. K. Baker, Johan Kruger, and Katharine I. Liebert.

It was announced that the donor of 1000 guineas to commemorate the presidency of Sir William Fletcher Shaw wished the interest to endow a lecture every second year to be given alternately by a member of the college on infertility, and by a gynæcologist from the USA as an expression of the friendship between our two nations. At the end of the meeting, Prof. Daniel Dougal assumed the office of vice-president and Mr. Eardley Holland that of president. A vote of appreciation for the services of Sir William Fletcher Shaw was adopted.

The following have been awarded the diploma of the college —

Agnes U. Campbell, W. H Carlisle, J. T. Carroll, J. M. Corston, Margaret C. S. Crocket, R. W. Danziger, Grace T Dawson, Mary E. Egerton, Charlotte L. Hess P. C. Lewis, Eileen C Miller, Mary L. Neville, Mary P Short, J. W. H. Simpson, Esther M. Swinnerton, J. W. Totten, and A H. C. Walker.

Tuberculosis Association

A meeting will be held at 26, Portland Place, London, W.1, at 3 15 PM on Friday, Nov. 19, when Dr. O Galtung Hansen, of the Norwegian public-health service, and Lieut.-Colonel C F. Bennett, RCAMC, will open a discussion on immunity-producing measures in tuberculosis

Pharmaceutical Society of Great Britain

Mr M. A. H. Tincker, D SC, keeper of the laboratory of the Royal Horticultural Society, is to speak on the use of plant-growth substances at the house of the society, 17, Bloomsbury Square, London, W.C.1, on Thursday, Nov. 11, at 7 PM.

New Appointments

Sir Henry Bashford has been released from the post of chief medical officer to the Post Office to take up a new appointment as Treasury medical adviser. Dr. W. L. Scott, second medical officer to the Post Office, succeeds Sir Henry as chief medical officer, and Dr. C. G. Roberts, an assistant medical officer, becomes second medical officer.

Dr. Scott, who is 55 years of age, was educated at Glasgow High School, the University of Glasgow, and University College, London. He graduated MB Glasg. in 1911, and after holding house-appointments at the Sheffield Royal Infirmary was appointed assistant medical officer at Chelsea Infirmary and the North Western Fever Hospital. He served throughout the whole of the last war and was awarded the MC in 1917. In 1919 he became a medical member of a pensions appeal tribunal. He joined the staff of the Post Office in 1921 and was appointed to his present post in 1934.

Dr. Roberts is 37 and was ed[illegible] e.. He qualified from the Westminster [illegible] s Cambridge MD in 1939. He was a [illegible] Castle before joining the Post Office staff in 1934.

Royal Society of Medicine

On Tuesday, Nov. 9, at 2.30 PM, at the section of experimental medicine and therapeutics, Prof. A. Fleming, FRS, Prof. H. W. Florey, FRS, Flight-Lieutenant D. C. Bodenham, Colonel E. C. Cutler, USAMC, Mr. R. Vaughan Hudson, and Prof. R. V. Christie will open a discussion on penicillin. Afterwards Professor Florey will show a film on the use of penicillin in the treatment of war casualties. At the same hour, at the section of psychiatry, Dr. E. S. Stern will speak on acute confusional insanity and delirium, and Dr. M. N. Pai on neuropsychiatric after-effects of cerebrospinal fever. On Nov. 10, at 5 PM, Dr. Cuthbert Dukes will give his presidential address to the section of proctology on the surgical pathology of rectal cancer. The clinical section will meet at 2.15 PM, on Nov. 12, at St. Mary Abbots Hospital, Kensington, W. 8. At 5 PM, on the same day, at the section of ophthalmology, Prof. Arnold Sorsby will read a paper on the incidence and treatment of ophthalmia neonatorum.

Socialist Medical Association

At a conference on a national service for health held on Oct. 17, Mr. Hector McNeil, MP, said that many doctors were afraid that such a service would lead to an increase in bureaucracy and red-tape; some such increase was, he feared, inevitable, but it could not come between the doctor and his responsibility for his patient. He mentioned, as an example, the decision of the Glasgow city council that homœopathy and other unorthodox methods of treatment should, as an experiment, be applied to patients in the city's fever hospitals. But the city's chief medical officer had made it clear that once a patient entered a hospital he became the responsibility of the medical staff only; and the project was abandoned. Mr. Somerville Hastings, FRCS, stressed the point that the only way to improve the standard of general practice was for doctors to work together in groups or teams. Dr. Horace Joules, the chairman, said he was a whole-time salaried practitioner and no money on earth would lure him to Harley Street—even if Harley Street was prepared to try and lure him. A speaker from the floor of the house criticised the salaries offered to doctors in municipal service, and urged the SMA to publish a salary scale; if this was really comparable with the earnings of private practice, he felt that much of the doctors' opposition would vanish.

Mass Radiography Film

The National Association for the Prevention of Tuberculosis has produced a short sound film about mass radiography, to show to office and factory staffs, managers, shop stewards and others before these examinations are to be made. It is thought that an advance view will help them to form a correct idea of what mass radiography is, disarm criticisms from management and workers and ease the complicated procedure of passing the subjects in and out of the X-ray room. The film is available in 16 mm. and 35 mm. size (non-flam) and lasts for twelve minutes. Further particulars may be had from Dr. Harley Williams, NAPT, Tavistock House North, Tavistock Square, London, W.C.1.

Dr. Russell J. Reynolds has been appointed honorary X-ray consultant to the directorate of medical supplies, Ministry of Supply.

The German minister of the interior has issued a circular (*Reichsgesundheitblatt*, Aug. 4, 1943, p. 524) cancelling the marriage health decree that members of the Wehrmacht and their fiancees must present a medical certificate that they [illegible] a Wassermann test.

Medical Casualties

The following medical casualties have been announced:

Missing.—Surgeon Lieut.-Commander Hugh de L. N. Davis, BM OXFD, RNVR, HMS *Charybidis*; and Lieutenant R. A. Palmer, MB CAMB., RAMC, parachute field ambulance.

Wounded.—Captain Gerald Bryne, MB BELF, RAMC, and Major A. F. Wallasey, MB LOND.

Middlesex County Medical Society

A meeting will be held at the West Middlesex County Hospital, Isleworth, on Tuesday, Nov. 9, at 2.45 PM. After a clinical demonstration Mr. W. J. Ferguson will speak on treatment of hæmatemesis and malæna in cases of recently perforated peptic ulcer, and Mr. D. M. Stern on the treatment of stress incontinence in women.

Royal Institution of Great Britain

On Nov. 26 the Friday evening discourse will be given by Sir Joseph Barcroft, FRS, who will speak on the preservation of foods by drying, and on Dec. 10 by Prof. H. W. Florey, FRS, who will speak on penicillin and its development for medical uses. Both lectures are to be at 5 PM. On Tuesdays, Nov. 2, 9, 16, at 5.15 PM, Sir Henry Dale, PRS, is to describe our progress in the treatment of infections, and at the same hour on Nov. 23, 30, Dec. 7 and 14 Prof. J. C. Drummond, D SC, will lecture on food problems of the postwar years. Further particulars may be had from the secretary of the institution, 21, Albemarle Street, London, W.1.

Appointments

Baer, Paul, MD MILAN, LRCPE, DTM & H: surgical registrar at the Bristol Royal Infirmary.

Nye, C. W., MB GLASG.; examining factory surgeon for Beverley, Yorks.

Births, Marriages and Deaths

BIRTHS

Binning.—On Oct. 28, at Cuddesdon, Oxon, the wife of Captain J. S. Binning, RAMC—a son.

Critien.—On Oct. 3, at Malta, the wife of Surgeon Lieut.-Commander G. R. Critien, RN—a son.

Jameson Evans.—On Oct. 28, at Bromsgrove, the wife of Mr. Philip Jameson Evans, FRCS—a daughter.

Laycock.—On Oct. 31, at Halifax, the wife of Dr. F. J. Laycock—a daughter.

McDonald.—On Oct. 23, at Oxford, the wife of Lieutenant D. A. McDonald, RAMC—a son.

Ogilvie.—On Oct. 29, at Canterbury, the wife of Dr. J. D. Ogilvie—a son.

Schier.—On July 18, at North Battleford, Saskatchewan, the wife of Squadron-Leader R. I. Shier, MB, RAFVR—a son.

Tanner.—On Oct. 26, in London, to Dr. Evelyn Tanner, wife of Mr. Norman Tanner, FRCS—a daughter.

MARRIAGES

Hood—Earp.—On Sept. 17 [illegible] Holland Hood, MB, lieutenant RAMC, to [illegible]

Rees-Jones—Williams.—O[illegible] edgely, William Tudor Rees-Jones, surgeon-lieutenant RNVR, of Swansea, to Molly Williams.

Stowell—Bradfield.—On Oct. 23, in London, Eldon Stowell, BM, to Hilda Mary Bradfield, section-officer WAAF.

Van Essen—Trotter.—On Oct. 23, in London, William Maurice Van Essen, MRCS, to Janet Clark Trotter, MB.

DEATHS

Anderson.—On Oct. 28, at Cardiff, William Campbell Anderson, MD ABERD, DPH.

Gunther.—On Oct. 28, at Hampton Wick, Hermann Arthur Gunther, MB LOND, aged 71.

Hopkins.—On Oct. 26, Charles Hensley Hopkins, MRCS, major, RAMC ret., of Ryelands, Weymouth.

Macalister.—On Oct. 25, at Bourton-on-the-Water, Glos. Charles John Macalister, MD EDIN, FRCP, aged 82.

Poynton.—At Bath, Frederick John Poynton, MD LOND, FRCP, aged 74.

Sargent.—On Oct. 27, William Gostwyck Sargent, LSA, LMSSA, of Padstow House.

Wain.—On Oct. 25, Jack Arthur Wain, MB WITWATERSRAND, FRCSE, DMR, assistant medical officer at the Christie Hospital and Holt Radium Institute, Manchester.

Willock.—On Oct. 10, at Exeter, Edward Hulse Willock, MRCS, LSA, former regional officer for the Ministry of Health.

The Index and title-page to The Lancet, Vol. I, 1943, which was completed with the issue of June 26, is ready today. A copy will be sent gratis to subscribers on receipt of a post card addressed to the Manager, 7, Adam Street, Adelphi, W.C.2. Subscribers who have not already indicated their desire to receive indexes regularly as published should do so now.

The fact that goods made of ra[illegible]
to war conditions are advertised
as an indication that they are

ORTHOPÆDIC INFLUENCE ON THE TREATMENT OF FRACTURES

A CLINICAL STUDY *

G. R. GIRDLESTONE B M OXFD, F R C S
CONSULTING ORTHOPÆDIC SURGEON, WINGFIELD MORRIS HOSPITAL, AND RADCLIFFE INFIRMARY, OXFORD

ONCE in his two years' term of office you encourage your president to talk to you without restraint, hoping, of course, that he will choose some subject appropriate and timely *I want to talk to you about the treatment of fractures in this country, to tell you how I think we can hel*

some l

As I

you may well ask for evidence of my competence as a judge and a reformer The best answer I can give is that close on 30 years ago I found a job after my own heart under great leaders and in good company For shortly before the first great war I came in contact with Robert Jones and Agnes Hunt at Baschurch, and soon found myself heavily infected with orthopædics My orthopædic education has fallen into three phases, those of the two wars and the time between

In the first great war burrowing sepsis, shattered bones, and extensive loss of soft parts presented every kind of *orthopædic problem*

In the twenty years between the wars I had ample opportunity of applying to fractures and to every sort of complication and failure the principles of orthopædic surgery which I was beginning to understand

Then came the present war, in which one side of my work has given me a comprehensive view of the treatment of accidents in the hospitals of six counties Only here and there have I found a hospital with a good accident service, although the case for such a service has been proved to the hilt A great many doctors are doing *excellent work for fractures with few facilities*, but I have had a chance to appreciate how much unnecessary suffering, delay and loss of function results from the treatment of accidents by men who seem to have given little time and thought to the matter This is both so distressing and so wasteful that for months I have been racking my brains for a remedy, and I have come to the conclusion that it lies in the clinical activities of the members of our association I am therefore asking very seriously for your help

Perhaps I can only enable you to realise the sort of thing that is happening by describing in some detail the maltreatment of one particular case

A HOSPITAL WITHOUT AN ACCIDENT SERVICE

Not very long ago I visited a hospital because the staff had appealed to their Member of Parliament asking him *to do what he could to stop the transfer of Service and* other fractures from their hospital to the neighbouring orthopædic centre, since they felt perfectly competent to deal with fractures themselves On my arrival I was introduced to the staff, and then taken to the theatre where a fracture table and two complex reduction mechanisms had been set up We passed on to the wards The climax of an unhappy round was reached when we came to the last case a young soldier who lay moaning and was clearly in great pain He had been admitted some six days before as a result of accidental bullet wounds which had broken the shaft of his left femur and his left internal malleolus The history was that after he had been treated for shock his wounds had been excised, and packed, then three or four days later sutured, though his chart showed unabated fever A long Liston splint was bandaged to his leg and thigh but in no way *connected with the pelvis or trunk* indeed the whole upper part projected free in the bed far from the body the limb below the fracture was twisted inwards and the thigh was lying in a varus curve at the site of the fracture for the splint had no upper attachment and therefore no control over the fracture either in alignment or rotation the bandages were soaked with pus and I was told that they were removed for daily dressing of the wound The man's sufferings were great, needless and futile It was a situation exciting both pity and anger Yet at the end of the round the members of the staff seemed unaware of having passed through any unusual experience

I learned that accidents reaching the hospital were received in turn day by day by the seven members of the surgical staff *The victim of an accident took his luck*, good, bad or indifferent This miserable visit was rounded off by the information that no single member of the staff had been to see fractures well treated at the orthopædic centre 20 miles or so away I had seen a modern well equipped hospital of 100 beds *or more* staffed by a group of doctors who seemed completely blind to the dire results of their ignorance of fractures and so complacent that none of them had motored a few miles to see first class work Appalling as this example was, it is by no means unique I know other reputable hospitals in which the same fundamental faults exist And what is true of the few big fractures is true also of the many little ones, which often require just as much skill and care

The apathy of many doctors toward fractures has its origin far away and long ago, for, as Hey Groves used often to tell us, from his long experience as an examiner, the teaching of fractures has been badly neglected Taught little, and by inexperienced residents, if taught at all, many of these young graduates went straight into 'private' practice, or to a house appointment in a non teaching hospital to work in wards quite secluded from an uninvited consultant Their treatment now is based on what they picked up in their training 10, 20 or 30 years ago, they are not careless or unfeeling, but just oblivious of a blind spot, and so much in a rut that *they do not take the trouble to go and see what a modern* accident service is like

THE DISORDER IS PATENT—WHAT IS THE REMEDY?

Some of us may be inclined to answer this question by saying that accident services are already being developed in many parts of the country, and that the postwar

t these things right
will have the oppor-
nd of taking part in
reasons however it is

likely to be impracticable to bring all fractures directly under the care of specialists, and, if so it will be necessary to make some provision in the smaller hospitals This will cover the treatment of the easier fractures and

thoroughly expert hands The former condition will be well and quickly realised if the doctors in each district grasp the idea, and carry out the selection, picking one or two men from among themselves with good hands and an interest in the power and movement of the body These men or their colleagues must possess a sound and

scitation
whose private
of fractur s
fectively and
and in doing

(1) Freedom from pain
(2) Freedom from pins (whenever possible)
(3) Freedom of the circulation in the injured part

Free circulation is, of course, a vital necessity in every case, but the warning signs of Volkmann's ischaemia must be specially recognised and treated in *the light of their implications Such are the conditions* which make for the safety of the part and facilitate the transport of the patient They can generally be satisfied by simple and straightforward means a sling or split plaster for the upper limb for the lower a Thomas splint (skin traction, lamp wicks and all in the old fashioned manner) or a split plaster *The understanding* of the application of a few simple methods can be acquired by everyone prepared to give up complex gadgets and to learn methods which demand little more than common sense and steady gentl

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* Presidential address to the British Orthopædic Association in London on Oct 29

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I am convinced that the standard of the treatment of fractures in this country will correspond with the clinical work and the personal influence of the members of this association; for the doctors of the country will seek advice and teaching from men whom they trust and respect, and are always ready to send their patients to a hospital which they know to be first-class. It is for each of us first to spread the knowledge of a safe system of splintage throughout his district, and secondly to set a very high standard in the work of his own hospital, work which is undertaken in clinical alliance with the staff of every department of the general hospital. Indeed he and his whole unit form one member of the diagnostic and therapeutic team of the region.

This should lead to a natural growth of service in accord with the trend, training and interaction of the medical profession. Therefore it should work. And I hope it will be backed, expertly inspected, encouraged, criticised and even disciplined through some regional organisation. I have little doubt that such a development, given financial support and the coöperation of our profession, will be welcomed by the administrators, medical superintendents, and governing bodies of the hospitals.

ORTHOPÆDIC LEARNING

If we orthopædic surgeons insist that the general practitioners and the staff of the reception hospitals shall give primary treatment to fractures on the lines I have suggested, and transfer difficult fractures, particularly those in which the function of the joints may be damaged, it is only right that we should give time and thought to these matters as they concern our own methods in our own hospitals.

Orthopædic surgeons see the seamy side of the life of the locomotor system; we grow familiar with every kind of failure and disaster, our own and those of our neighbours; we see delayed union, non-union, malunion, secondary arthritis, stiff joints, and, worst, of all the end-results of traumatic or early post-traumatic ischæmia. Some of these conditions are so distressing and incurable that it is natural that we should try to trace the cause in each case and consider how the failure could have been avoided. When we do this we find that the great majority of bad results are due to a lack of knowledge, of dexterity, of gentleness, or of sustained interest in the aftercare. But our native job is the restoration of the disabled patient to activity. That is the difficult task on which we sharpen and temper our orthopædic wits, until we become able to perceive what is best for each case and how to achieve it. It is a life-long apprenticeship. As we become familiar with the ways of the living tissues which are the materials of our craft, we understand how to get them to work with us and not at variance. If we want the cells to be active, we supply them with plenty of blood of good quality; if we want bone, we push the matrix; if tendon, we pull it; if resilient fibrocartilage, we move the parts over a wide range without weight-bearing for many weeks. We have been directed toward this knowledge by the insight of Samuel Butler, and by the research and practice of those *Menders of the Maimed* who were immortalised by Sir Arthur Keith in the orthopædic surgeon's bedside book.

If we have set ourselves to understand our craft we owe that wholesome attitude of mind to the tradition set by Robert Jones, Osgood and the other leaders of this association. They have made us mobile and teachable, impressing upon us that we must meet regularly, travel widely, and discuss freely. We meet regularly and so form a society of friends, eager to talk shop and swap ideas; we travel widely to see the work of other men at home and abroad; and we discuss freely in a spirit of mutual understanding and goodwill, seeking the truth without fear of offending one another, showing our failures and confessing our difficulties.

ACTIVE HYPERÆMIA

We know, and we must go on telling others, that the avoidance of constriction in the region of a fracture is not enough. There must be room for the expansion of *tissues in which repair is proceeding; the cells of the* callus matrix need a plentiful supply of blood from which [illegible] can extract what they need, their food, their building [illegible], and such vitamins and hormones as are [illegible] for their constructive activity. One has only to realise what is happening round a recent fracture to become aware of one reason why there is so much delay in union in these days of skeletal traction.

POWERFUL PERSISTENT TRACTION

There has always been a potentially harmful factor inherent in the method of weight-and-pulley traction; but much actual harm has been done since skeletal traction has made it possible to use heavier weights, and to leave them at work for long periods. H. O. Thomas taught from his practical experience that fixed-extension on a Thomas splint was better than weight-and-pulley traction. The regular and rapid healing which Thomas achieved by the classical use of his bed-splint is proof of the virtue of that form of splintage which maintains length but does not maintain traction, and allows scope for the hyperæmia which is part of the natural reaction to trauma. This for him sufficed, for he knew little of the virtue of muscular activity round the fracture which adds a physiological source of hyperæmia; to him rest of the parts was the condition under which healing could proceed without disturbance. He would have been horrified by the powerful, unrelieved, *stretch which skeletal traction can impose upon the* tissues round a fracture.

Think of it for a moment! The continuity of the bone is broken, skin and muscle are relatively elastic and therefore the stretching force is applied to the infiltrated periosteal and other connective tissues round the fracture, tissues swollen and angry with reaction, alive with young mesoblasts, and amply supplied with blood. This is to become the callus matrix, a proliferative mother tissue, ready to bring forth bone to heal the fracture. The pull of a heavy weight which remains in just as powerful operation after the normal length of the part has been reached, inevitably provokes a reflex protective and persistent spasm of the muscles. Stretched by the weight and starved by the muscular spasm, the tissues round the fracture change from a vascular matrix to barren, white fibrous tissue. It is small wonder fractures thus treated unite very slowly, if at all.

This frustration of healing is in sharp contrast to what happens with a Thomas splint correctly used. The restoration of anatomical length is obtained by almost momentary pulls repeated once or twice a day with plenty of time between for the proliferation of the pre-osseous tissue. The muscles are comfortably at rest. With the flexion piece of Maurice Pearson (Natal) added, the principle of fixed extension is preserved, and a wide range of movement made available.

That continuous mild traction can give good results has been proved by Pridie, who has gone so far as to say that every fractured femur should be put up in a Russell traction with a 10 lb. weight for the first two or three days and a 5 lb. weight subsequently. But surely the Thomas-Pearson-Balkan frame combination (TPB for short) is much to be preferred, both because the fracture is accurately held in length and line, and because movement of the knee is safe at an early stage through its admirable control. Fixed extension is employed by separate pairs of adhesive strapping; one pair is applied to the thigh and attached to the end of the Thomas, the other to the leg and attached to the end of the Pearson. The whole limb is visible, comfortable, and in turns restful and active; indeed the contraption supplies the patient with a working toy—and after the first few days he is taught to play with it off and on all day, synchronising the action of cord and quadriceps.

FRACTURES INVOLVING JOINTS

Difficult articular fractures fall into two groups: (1) those in which there is difficulty in restoring the shape of the articular surface, and maintaining it without allowing the joint to become stiff; and (2) those in which the difficulties are due to avascular necrosis of a fragment.

Fractures of the articular table of the tibia and fractures involving ankle or subtalar joint are good examples of the first group. In both these the indications following a good reduction are to protect the arti*cular surface from weight-bearing or other distorting* force for a long time, and yet to initiate movement soon.

In fractures of the articular table of the tibia I have found the method of reduction described by Kindersley very good, and am sure that this should be tried before deciding on open operation. Three factors contribute to reduction, an Esmarch bandage round the head of the tibia, strong traction, and the repeated mild blows of a mallet round the fracture through the bandage. Open [illegible]

[illegible] rest at about 170°, movements are commenced, for the first few days slow and passive, morning and evening, then by the cord and active contraction of the quadriceps. Here we have freedom for muscular, articular and vascular activity; and a treatment in every way preferable to immobilisation in plaster-of-paris and the stubborn stiffness of the knee which follows.

TARSAL FRACTURES

Almost all the tarsal fractures involve joints, and in all after reduction we naturally desire early movement and protection from weight-bearing strains until the danger of secondary deformity is over. There is a simple way I have been using lately to allow the patient to walk with free movement of knee, ankle and subtalar joints.

The leg is in plaster from knee to ankle with the bars of a walking iron spread well clear of the foot, which may be free in a short sock and slipper, or be held in a low plaster shoe with sufficient gap between the two plasters to allow movement of the ankle and subtalar joints. The shin and the head of the tibia need careful padding and moulding and an inverted V is cut over the tendon behind. I have found it impracticable where there is much subcutaneous fat. The patient's weight is transmitted to the leg, and he can be taught to move the ankle naturally as he walks.

The method is very simple and I hope that it will be found helpful in fractures of the os calcis and of other bones of the foot, as well as of the tibia and fibula in the neighbourhood of the ankle-joint. It offers free movement with safety at a very early stage, how early must be decided in each case.

SCAPHOID GRAFTING

McMurray has told us, and I think that many of us go a long way towards agreement, that a scaphoid of the right shape and size, united or not, is a good scaphoid: and that a scaphoid of the wrong shape, united or not, is bad (there are, of course, degrees of badness). Is it not true that late disability in this fracture is confined to cases with limited movement, particularly limited extension? If this is so, is not reduction, if it can be accomplished at this late stage, far more beneficial than bony union, and particularly reduction which will restore full extension?

Are we not beginning to see that the possible indications for grafting are confined to (1) an early case in which after two or three months a series of radiograms has shown that exact reduction, followed by accurate immobilisation, is [illegible] (2) a late case with disability [illegible] reduced? And how far even [illegible] grafting cannot be settled [illegible] we know whether union is any better than non-union, and if so, how much; and whether mal-union is better than mal-non-union. These are questions to which our fracture committee might well turn its attention. We cannot expect definite answers to such sweeping questions, but we can hope for a clarification of our conception.

I think that the field for grafting will be confined to a very small proportion of cases, and will exclude those in which there is evidence of secondary arthritis. Furthermore, in defining the field, it is well to remember that the operation, even in practised hands, is neither always successful nor devoid of risk of carpal damage.

It seems likely that most of the cases with a late disability associated with lir[illegible] to non-reduction and a fa[illegible] and a lack of rest during [illegible] months, during which period active use of the hand is encouraged. When we do this we should aim at the reduction and close apposition of the parts.

Since an ill-fitting scaphoid commonly causes obstinate pain and [illegible]ers it is very desirable that thos[illegible] primary plaster should make sur[illegible] by radiography, and afterwards take steps to avoid disturbance of the immobilisation during radiography. The young granulation tissue beginning to penetrate the avascular fragment is very delicate, and can be torn by an inadvertent passive movement of the wrist. For this reason removal of the plaster must be accomplished with the utmost care, and the surgeon or sister who has made the plaster ready for removal should go with the patient to the X-ray room and guard the wrist from any movement. This care is necessary at each change until union has been achieved; and those who take these precautions will see few non-unions, and, we can safely prophesy, even fewer cases of subsequent pain and disability.

ATTRACTIVE OPERATIONS—ATTRACTIVE FOR SURGEON OR PATIENT?

As today I am free to give advice, I would recommend great restraint in the performance of the more exacting and therefore attractive operations; and suggest that we should be very critical of new operations, examining their claims closely in the light of biology and physics, and so reach a clear conception of their virtues and indications. Particularly is this so when they carry a risk of doing harm if imperfectly performed, as in scaphoid grafting; and it is even more necessary when they are dangerous to life, as in anterior grafting for spondylolisthesis. None of us nowadays can doubt the soundness of adequately long and strong posterior spinal graft synostosis for spondylolisthesis in those cases where operative fixation is indicated. It is a sound job; the buttress carrying [illegible] made as strong as the [illegible] straightforward and [illegible] are commonly and frequently performed by orthopædic surgeons. The alternative approach from the front is relatively dangerous; it cannot produce a more effective buttress, and it must be extremely difficult to place a graft or grafts of adequate strength exactly where they are required. In a word the operation is rare, difficult and exacting. Now a very good operator can make a rare difficult and exacting operation easy and safe—almost always! Very well! leave him to it if you know a safer and simpler way. A "surgical exercise" on the cadaver will prove your skill to the examiner; you can help your patient better in humbler ways. The surgeon we want for ourselves and our children is one who will not operate if he can attain his purpose by conservative means, and who prefers a safe and simple operation to one which is attractive to perform, though perhaps a little dangerous.

INTRACAPSULAR FRACTURES OF THE NECK OF THE FEMUR: THE REDUCTION AND THE RESULT

In the past the great majority of these fractures failed to unite; this is still true even of those that are pinned, though here the majority will no doubt be smaller. I am, of course, referring to the total number in which pinning has been carried out; for we know that in skilled hands the majority unite. Imperfect reduction is probably the most common cause of failure, closely followed by subsequent loss of position due to faulty technique in the pinning operation, to faulty placing of the pin or to subsequent difficulties associated with avascular necrosis. It would be very interesting to find out the facts; the fracture committee of the association might well consider an inquiry not confined to work in orthopædic hospitals or other accident services, but on a basis which would take in all hospitals and nursing-homes within the area investigated, in order that the [illegible]

up of an impaction (with a touch of external rot[illegible] provided that it gives an adequate area, [illegible] indeed the preservation of impaction is [illegible] surest and most acceptable treatment [illegible]

Smith-Petersen's pin with its exquisite design and the various ingenious gadgets which mechanise its insertion, have tended to put accurate reduction off the centre of the stage, which is its proper place. But once the fractured surfaces have been brought together the aim of Whitman and Smith-Petersen is identical—namely, to maintain this intimate apposition. What Whitman did with plaster can only be copied by the disciples of Smith-Petersen if we make sure that the pin is so placed that it has the strongest possible purchase on the head and is inserted without the least tilting or diastasis of the fragments. The slightest technical error can completely spoil a perfect reduction by a little tilt or separation; therefore no-one should complete the operation without making sure of the exact position of the pin, and the intimate apposition of the fragments, after the last blow of the hammer, by final anteroposterior and lateral radiograms.

There can be no doubt that in subcapital fractures a tibial graft above the pin gives additional security; the value of the graft is enhanced when the creeping substitution in its neighbourhood proves speedier than that round the pin, because the periods of feeble hold of the graft and of the pin do not coincide.

Intracapsular fractures unite only by direct contact; that is my point, the union of an intracapsular fracture depends absolutely upon a reduction which is subsequently undisturbed. Such an achievement makes union certain, though when the head is avascular the contact must be maintained much longer—and that is where plaster fails. On the other hand Kemp, our consulting radiologist, assures me that, from a comparison of X-ray films of cases pinned with those of others treated by conservative means, he suspects the Smith-Petersen pin of being a potent killer of heads; and he tells me that Brailsford shares this view. Their conclusion would, no doubt, be tested if the inquiry I have suggested is undertaken. But the observation might well have been reached by deduction, for the pin as it cuts its way into and through the centre of the head must play havoc with its intrinsic vascular system. Is the pin doing for old heads what Lorenz did for young ones?

I am inclined to think that here again there may be a field for conservative treatment. We know that excellent reduction will often follow a few days on Russell traction or the TPB; and, since it has been our practice hitherto to pin the fracture at this time, we know that the reduction is not easily disturbed by the lifting and moving that are necessary preliminaries to pinning. Does not this suggest that after accurate reduction—the first and absolute necessity in any case—prolonged use of Russell traction, or better of the TPB, would give results comparable with those of the pin? These two methods of splintage exert a pro-anatomical influence which depends mainly on mild traction in the presence of slung flexion of the knee which controls rotation; and their trial would represent a very natural swing of the pendulum, by no means back to the discomforts and the mortality of the Whitman plaster, but to an equally reliable and much more acceptable means of maintaining reduction, with the patient free to sit up in bed, and move his knee. One would insert a pin if signs of avascular necrosis should appear.

THE DEAD HEAD

Avascular necrosis with all its delay and trouble, occurs in a considerable proportion of high fractures which have been pinned, however expert the operation. We have, therefore, to X ray these cases at intervals month after month to ascertain whether the head is alive or dead. If relative hypercalcification appears we know that it is dead and see danger in the offing. This danger begins with the softening of the bone close to the fracture line and spreads until, months later, the cortex can be crushed. The patient is now put into a weight-bearing calliper and warned to avoid any wrench of the hip, such as the sudden lifting of his calliper-laden limb on to a sofa by muscular effort. It may be necessary to explain to the bewildered victim why he finds himself at so late a period hedged round with new warnings and condemned a calliper for a very long time. For there are five through which a dead head must be guarded on y back to life and strength: invasion by vascular granulations; colonisation; absorption of the old trabeculæ, which were built to carry the weight of the body; replacement of strong bone by primitive spongy bone with spicules that are feeble but cell-controlled and therefore responsive; finally retrabeculation, a response to re-education by graduated function. Dangers beset the head at every stage, concerning first its union and then the integration of its structure. Invasion and recolonisation require good reduction and perfect immobilisation so that the granulations may pass directly and continuously from the living to the dead bone: granulations cannot cross a gap if the dead surface is washed by synovial fluid, for they have no amphibious equipment. Then come the stages of special delicacy and danger when the strong old bone is being replaced by soft new bone which is for a time quite unfit to carry much strain, far less the weight of the body. This period begins some months after the fracture, and lasts for at least another 18 months. It is as if the dead head had to be melted down and recast, but the living process is very, very slow—Phemister rightly named it "creeping substitution."

With such gradual biological processes as I have been describing, and which are necessary to the healing of other injuries, the orthopædic surgeon is at home; for if he is worth his salt he has learnt a due regard for the living reactions of the connective tissues. He knows the conditions they like, the time they need for their various activities, and how their help can be encouraged and directed: he has followed Sir Arthur Keith's advice in cultivating "a close acquaintance with the behaviour of osteoblasts."

THE HOSPITAL AND THE PATIENT

A gentle kindness is the natural response of nurse and surgeon to a patient in distress; it is easy when all he needs is to be tucked up snug and warm in bed and put to sleep, but difficult when treatment demands the unwelcome contact of splint or plaster. The mercy of an orthopædic hospital must be very practical, like that of the Good Samaritan. But it will only be effective if it is based on skill hardly won and generously given by men and women who have taken pains to acquire an intimate knowledge of their work, and are unsparing of time and trouble, day after day, to ensure the exact adjustment of the splintage and the comfort and well-being of the injured part. Loving-kindness put into the effective care of little things graces the work of such a hospital. Then rest comes gently to a broken body and reassurance to a shaken mind.

NAPT Scholarships in Social Work.—The National Association for the Prevention of Tuberculosis is offering two scholarships of £25 each to help suitably qualified women to obtain experience in the social side of tuberculosis work. Candidates will be selected by the association with the advice of the institute of Hospital Almoners, and qualified almoners and students in their last year of training with the institute should apply before Dec. 10 to Dr. Harley Williams, NAPT, Tavistock House North, London, W.C.1.

Further Facilities for Treating the Injured Worker.—Since 1941 a large proportion of workers have been eligible for treatment in hospitals or centres of the Emergency Hospital Scheme when they sustain fractures, whether in the course of their employment or not. Since last April they have included manual workers in all factories, and those engaged in building, civil engineering, mining, agriculture, fishing, public utility undertaking, shipping and transport, together with whole-time Civil Defence workers. Circular 2876 of the Ministry of Health states that these workers will henceforth be eligible for the treatment not only of fractures but also of (1) dislocations, sprains, displacement of semilunar cartilages, and other injuries requiring the specialised attention of orthopædic surgeons (including those involving nerves or tendons or severe injury to soft parts); (2) injuries to the head (and their sequelæ) ordinarily treated at head centres in the Emergency Hospital Scheme; and (3) burns severe enough to require inpatient treatment. The extended service is not intended to apply to minor injuries which do not need the advice of a specialist.

A revised list of orthopædic centres, fracture departments and fracture clinics has been issued.

EFFECT OF ALTITUDE ON CASES OF PNEUMOTHORAX

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With Comments on the Electrocardiograms by
D M ANDERSON, MD EDIN, MRCPE
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FOR some time before the war air transport was being increasingly used in civil life, and since the outbreak it has proved valuable for the transport of wounded to the base Some of these have chest wounds associated with pneumothorax or hæmopneumothorax, and, wounded apart there are a few pilots in the RAF, thoroughly trained and valuable to the country, in whom artificial pneumothorax has been induced as a treatment for pulmonary tuberculosis It therefore seemed useful to study the effects of altitude on pneumothorax so as to decide (1) the optimum height for the transport of wounded with this condition, and (2) the height at which a pilot with an artificial pneumothorax can safely undertake flying duties

Air transport is comfortable, and air ambulances are now in use in all the belligerent countries In order to find both the optimum flying height for chest cases and the necessary adjustments to be made before or during the flight a series of experiments were carried out in the low pressure chamber on the reactions of cases with pneumothorax to varying altitudes

Boyle's law states that if the temperature remains constant the volume occupied by a given quantity of gas varies inversely as the absolute pressure exerted on it, or conversely, if the gas cannot expand, the differences of pressure correspondingly increase In applying this law to the experiments which follow I have had to allow for the mobility of the mediastinum, the presence or absence of pleural adhesions, or the presence or absence of adherent lobes of the lung

It was well known in the old days that a patient with an artificial pneumothorax ascending to the Swiss sanatoria, situated between 1000 and 6000 feet, became dyspnœic and often needed some air taken off on his arrival, and the converse held when he descended at the end of his sanatorium treatment I thought it would be a good thing to study, by screening and films, the effects on various types of pneumothoraces

MATERIAL AND METHOD

A group of 4 cases were selected, 2 right sided and 2 left sided pneumothoraces Case 1, right sided was a complete pneumothorax with a mobile mediastinum, case 2 had a partially fixed mediastinum with a large apical adhesion, and of the left sided cases case 3 had a mobile mediastinum with an apical adhesion and case 4 a completely adherent left upper lobe with the mediastinum fixed in its upper part and mobile in its lower third In both left sided cases a trace of fluid was present at the base I chose the same type of case on the two sides in order to see whether vascular changes would be greater on the left than on the right owing to the increased pressure on the heart and great vessels

Experiments in the pressure chamber were conducted under the following heads

1 Clinical changes
2 Radiological changes
3 Electrocardiographic records
4 Changes in vital capacity
5 In the first 2 cases analysis of the alveolar air at various heights

EXPERIMENTS

The first experiment on the right-sided pneumothoraces was carried out on May 11, 1942 For convenience I shall write of the changes of pressure as if they were changes of height Each patient was taken in separately at the start, while at ground level, the [illegible]
tached, the patient
X ray equipment
capacity machine
first cases to climb
500 feet a minute and to take tests of the vital capacity, the electrocardiogram and the alveolar air, together with an X ray screening and photograph, at 2000, 4000, 6000 and 8000 feet and then every 1000 until the maximum height to which we thought it safe to take each patient had been reached

Table I shows the height, the vital capacity and the alveolar partial pressure of cases 1 and 2 (case 1 with a mobile mediastinum and case 2 with a fixed mediastinum), and fig 1 compares the alveolar pressure of the two cases with that of a normal subject

At the various heights mentioned, both on ascending and descending, the patient was screened in expiration and inspiration at 2000 4000, 6000, 8000 and 9000 feet and was X rayed in deep inspiration at the same heights

Clinically, case 1 showed no ill effects until a height of 8000 feet when he complained of a tight feeling in the chest and a pull on his right apex on breathing At 9000 feet his pain became acute and thus it was decided to cease the ascent. The screen examination of this case in expiration at 9000 feet showed a great pull of the mediastinum to the left with congestion of the whole of the left lung

Case 2, with the fixed mediastinum behaved clinically in a different manner His symptoms began at 6000 feet when he commenced to feel slight dyspnœa and some pain over the right border of the sternum at the level of the second rib anteriorly At 8000 feet the dyspnœa was worse and the pain more acute The great veins in the neck began to be noticeable At 9000 feet the pain had increased and the congestion of the great veins was considerable The pulse rate as shown by the electrocardiogram had increased considerably The ascent in this case was terminated at this level

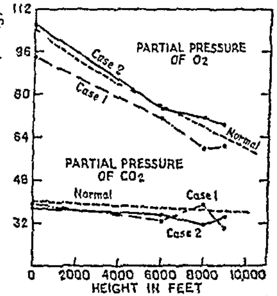


Fig 1—Anoxia curves in cases 1 and 2 compared with those of a normal subject at various heights

The screen findings at ground level and at 6000 and 9000 feet in both inspiration and expiration, of cases 1 and 2 are shown in fig 2, and the radiograms of case 1, taken in full inspiration at the various heights, in fig 3. The radiograms of case 2 are shown at ground level, 6000, 8000 and 9000 feet (fig 4)

Screen examination (fig 2) proved, in this experiment, more significant than the film It showed not only the striking difference in the amount of collapse between inspiration and expiration, but in case 2 displayed to better advantage than the radiogram the large hernia of the anterior mediastinum which developed, especially at the higher altitudes—for example, at 8000 and 9000 feet

With cases 3 and 4 the left sided pneumothoraces it was decided to ascend at a slightly faster rate in order to ascertain whether rate of climb made any appreciable difference It was also decided in this experiment which took place on Aug 27, 1942 to take the pressures of the pneumothoraces at ground level and at the peak of the ascent the manometer having previously been adjusted to give comparable pressures at this height and at ground level

It was decided on this day to take up a 5th case that of a spontaneous pneumothorax who still had a small bronchopleural fistula present—proved by a previous analysis of the air in his pneumothorax Table II shows the time taken and the various tests carried out at the various heights The results of screening are not shown as they agree with the radiograms taken in both expiration and inspiration Radiograms at ground level 6000 feet and the peak of the ascent both in inspiration and expiration are shown in fig 5 In case 5 the radiogram at ground level and 6000 feet during inspiration and expiration are shown in fig 6 the screening did not differ from these findings It will be noted that despite the presence of this small bronchial fistula in case 5 the underlying lung collapsed as the ascent proceeded and at 6000 feet the patient felt pain and was slightly dyspnœic It was decided to end the ascent at this level

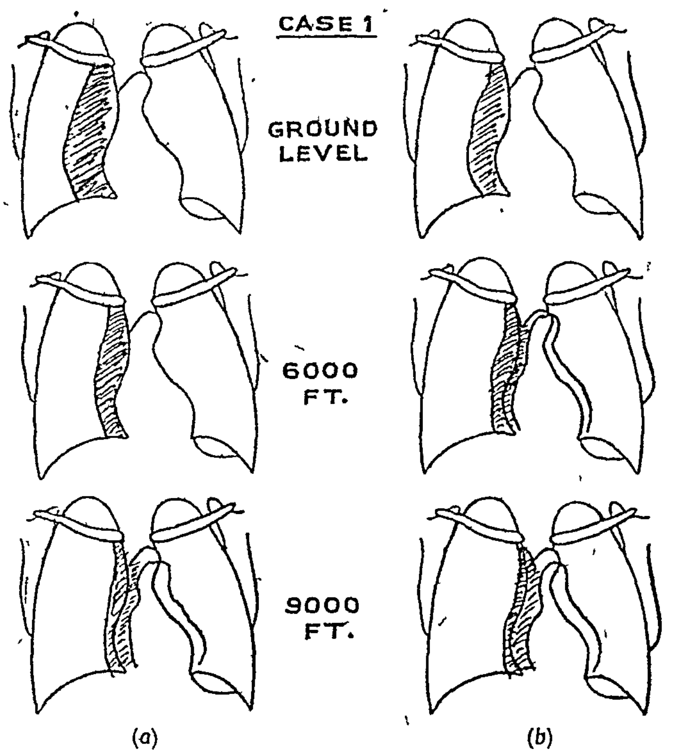
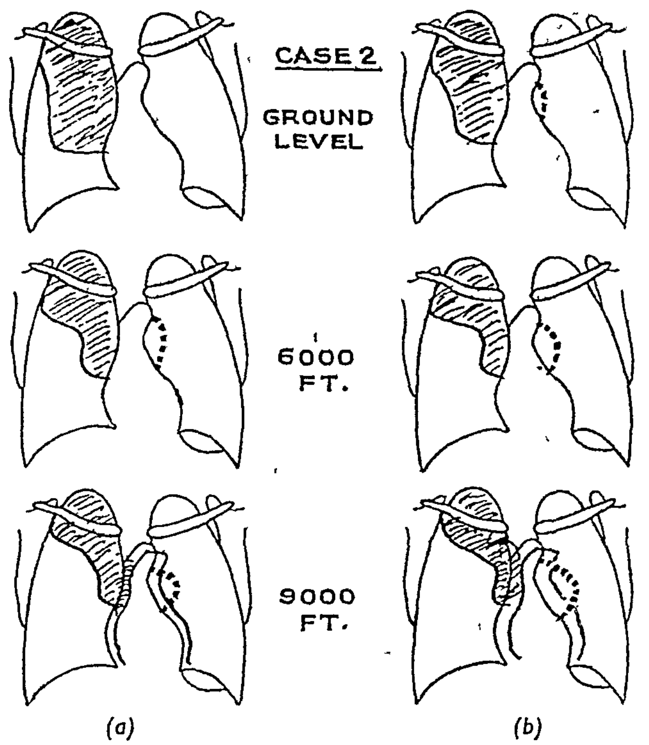


Fig. 2—*Results of screening* (cases 1 and 2): (*a*) inspiration; (*b*) expiration. Case 1: First pair, ground level; 2nd pair, 6000 ft.; 3rd pair, 9000 ft.



Case 2: 4th pair, ground level (anterior mediastinal hernia); 5th pair, 6000 ft.; 6th pair, 9000 ft. (anterior mediastinal hernia much longer).

Electrocardiographic Tracings of the Cases

(WING-COMMANDER ANDERSON)

CASE 1.—No significant change apart from minimal right axis shift. There was increased amplitude of the P waves, due to the increased rate.

CASE 2.—No significant change. Slight right axis shift of 10°, increase in rate with prominence of P and inversion of T3, all attributable to slight torsion of the heart produced by the mechanical effect of increased tension in the left chest in a person with a fixed mediastinum.

CASE 3.—No significant change apart from increased prominence of inverted T waves at altitudes of 7500 feet.

CASE 4.—No significant change, but it is noteworthy that the configuration of the chest lead was absolutely constant and unchanged throughout, although the underlying heart moved a distance of about 2 in. from left to right, the lead

TABLE I—EFFECT OF ALTITUDE ON PNEUMOTHORAX CASES

Case	Height (ft.)		[illegible]	[illegible]	
				CO_2	O_2
1. R.-sided; mobile mediastinum	Ground		2550	36 9	94 0
	Ascent 500 ft. per minute	2000	2525	..	..
		4000	2350	..	..
		6000	2200	33 2	71 2
		8000	2050	38·2	59 8
		9000	1600	29·8	60·7*
	Descent	6000	2250	..	..
		4000	2350	..	..
2. R.-sided; apical adhesions, partly fixed mediastinum	Ground		2925	35 6	106
	Ascent 500 ft. per minute	2000	3000	..	..
		4000	2800	..	..
		6000	2550	34 6	74 7
		8000	2500	31 7	71 1
		9000	ND	34 0	68·7
	Descent	6000	2500	..	..
		4000	2750	..	..

Not done owing to condition of patient. * Doubtful.

TABLE II—EFFECT OF ALTITUDE ON PNEUMOTHORAX CASES 3, 4 AND 5

Case	Height (ft.)		Time of ascent and descent (min.)	Effect
3. L.-sided; mobile mediastinum; trace of fluid	Ground		Zero	Pressure: 0, —5.
	Ascent	2000	4–5	..
		4000	8–11	Pulse 78. Beginning to feel a pull.
		5000	13	..
		6000	15–29	Pulse 78. Resp. 20. Pull still present. Sl. short breath. Pressure: 0, +8.
		6500	30	..
		7000	32–41	..
		7500	42–52	Pulse 80. Some pain in chest. Feeling tight. Pressure: +3, +8.
	Descent	6000	56–59	Pain easier.
		4000	62	Slight pain only.
	Ground		67	..
4. L.-sided; adherent apex, partly fixed mediastinum; trace of fluid	Ground		Zero	Pressure: —4, +2.
	Ascent	2000	2–5	..
		4000	7–11	..
		6000	14–19	..
		7000	21–23	..
		8000	26–32	Feels lump in throat as at refills. Pressure: +10, +15. Tight at base.
	Descent	6000	34	..
		3000	39	..
	Ground		43	..
5. R.-spontaneous pneumothorax with bronchopleural fistula	Ground		Zero	..
	Ascent	3000	3–6	..
		6000	11–16	..
	Descent	ground	26	..

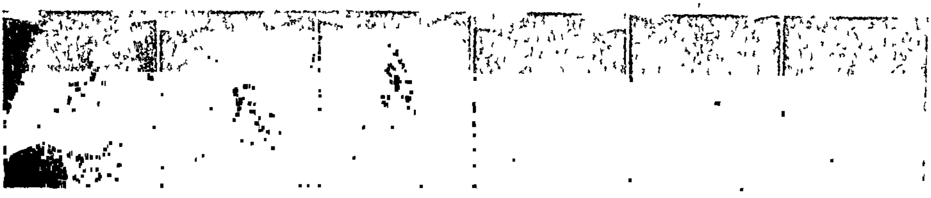


Fig 3—Radiograms of Case 1 taken at full inspiration at various heights

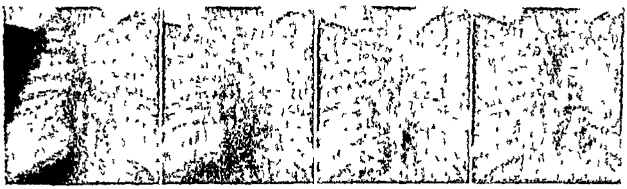


Fig 4—Radiograms of Case 2 on full inspiration at various heights.

originally lying approximately over the left side of the right ventricle at ground level and about ½ in. beyond apex at 7500 feet.

Though there was appreciable mediastinal movement with increased altitude demonstrable by X rays, the change in the electrical axis was negligible in all cases, the greatest shift being noted in the case where the mediastinum was fixed. This suggests that torsion, rather than lateral movement, is responsible for change of electric axis. The fact that, in 3 of the cases, the T waves were almost iso-electric at ground level, with a tendency to become either biphasic or inverted at altitude, might explain the T wave inversion in all leads at ground level in the remaining case. In this —case 4—neither the clinical findings, the X-ray configuration of the heart nor the remaining complexes of the electrocardiogram provided evidence to suggest the presence of myocardial disease.

Discussion

From this experiment it is possible to draw conclusions about the optimum heights to which a patient with pneumothorax can fly, the necessary precautions to be taken in transporting wounded, and the instructions to be given to a pilot flying with an artificial pneumothorax.

It is dangerous to fly cases of tension-pneumothorax at any height until a needle has been put in position in the chest wall to allow the air under pressure to escape; and it is essential to leave this needle in position during the whole of the flight. It is a well-known rule that cases of open, sucking pneumothorax, due to wounds, should have the wound closed at the earliest possible moment. In these cases, when it is necessary to fly to the base for further treatment, this presents difficulties. No-one doubts the necessity for making an open pneumothorax a closed one as soon as possible, but if a flight is to be undertaken after this and the height of the flight is over 5000 to 6000 feet, it will either be necessary to place an intercostal tube in position before the flight starts, or, if this is not possible, a doctor must accompany

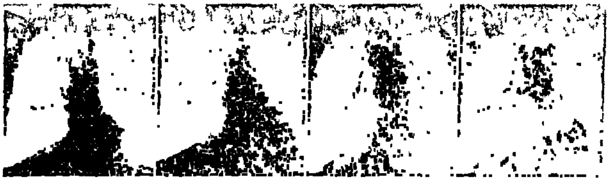


Fig. 6—Radiograms of Case 5 on inspiration and expiration at ground level and at 6000 ft.

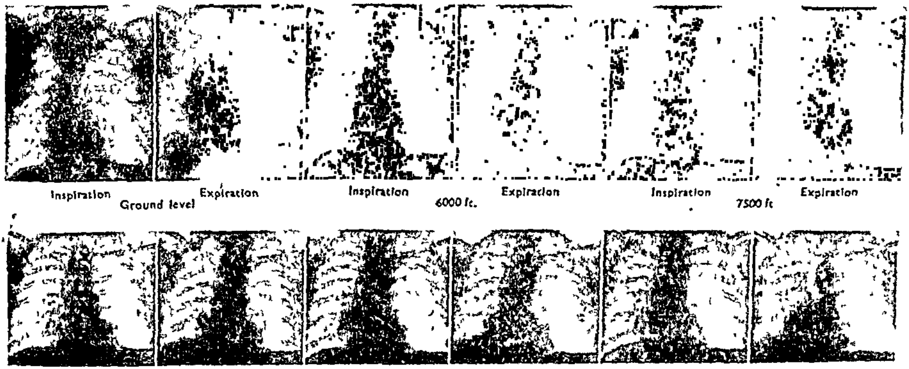


Fig 5—Radiograms of Case 3 (above) and Case 4 (below) on inspiration and expiration at various heights

the case and be ready, should the dyspnœa or pressure in the chest become acute, to allow some of the air to escape through a needle. If the open pneumothorax wound is such a size as to necessitate covering only with a sterile vaseline-gauze dressing, this can be lifted momentarily at height to allow the excess air to escape, being placed back in position as soon as the patient is comfortable.

Lovelace and Hinshaw[1] recommend that patients with a tension pneumothorax should never fly in an ambulance above 3000 feet unless the proper equipment to aspirate air from the pleural cavity is present. It has been pointed out by Lovelace[2] that some patients do not stand aerial transport well if heights in the neighbourhood of 10,000 feet are necessary. Pneumothorax cases may have their pressure increased so much that disastrous effects on the collapsed lung and mediastinum may ensue, and he states that in countries such as the British Isles the disadvantages of aerial transport may outweigh the advantages in cases such as this.

CONCLUSIONS

If possible, no patient with a wound of the chest causing pneumothorax should go above 4000 feet if transported by air to the base. If it is necessary to go to greater heights the pressure should be adjusted by removing as much air as possible before the start of the journey.

In cases of tension-pneumothorax due to escape of air through a lacerated lung it will be necessary to place a needle or an intercostal catheter in position, in order to control the pressures during the flight. Pilots, or passenger personnel, with an artificial pneumothorax, should not fly by aeroplane at the most above 6000 feet for any length of time and should on no account, even for a few minutes, go above 8000 feet.

Those with a mobile mediastinum appear to stand altitude better than those with adhesions or a fixed mediastinum, in whom there is always danger of rupture of an adhesion.

By disregarding the underlying lesion in the lung in a case of artificial pneumothorax and removing most of the air before the ascent it is possible to allow the patient to fly higher; but this is to be deprecated, since expansion of a lung collapsed by artificial pneumothorax is likely to exacerbate the underlying disease. If a case of artificial pneumothorax must undertake a flight up to 8000 or 10,000 feet, he should go just before a refill is due, and not immediately after one.

SUMMARY

Experiments were carried out in the low-pressure chamber to ascertain the effect of height on various types of pneumothorax.

Two right-sided cases, one with mobile (case 1) and the other with partially fixed mediastinum (case 2) and two left-sided cases, one mobile (case 3) and one partially fixed (case 4), and one right-sided case with broncho-pleural fistula (case 5) were taken as subjects.

Screening in inspiration and expiration was carried out at various altitudes, and radiograms in inspiration in cases 1 and 2 and inspiration and expiration in cases 3, 4 and 5 were taken. Readings of vital capacity and analyses of samples of alveolar air were done in case 1 and 2 at the various heights. Electrocardiograms were taken in 4 of the cases at various heights.

The conclusions drawn are stated above.

I wish especially to thank Prof. B. H. C. Matthews, FRS, DSC, and Air-Commodore A. F. Rook, OBE, RAF, consultant in medicine, for their great help and cooperation. My thanks are also due to the medical personnel of the Royal Air Force for their valuable help in making these experiments possible and to Dr. G. M. Little for taking the pressures in the chamber.

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2. Lovelace, W. R. *Proc. Mayo Clin.* 1941, 16, 221, abstracted in *Bull. War Med.* 1942, 2, 238.

The library of the Royal College of Surgeons in Lincoln's Inn Fields has benefited by the gift from the Rockefeller on of a micro-film reader, which will facilitate access work done abroad and at present difficult to come this country.

DELAYED TUBERCULIN REACTION

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IN tuberculosis surveys which include tuberculin tests as part of the routine examination, it is common to retest regularly at least all those persons who fail to react to tuberculin. Where a positive reaction is recorded at subsequent tests, one can assume that tuberculous infection has taken place between the date of the last negative test and that of the first positive This interval is usually 6 or 12 months or more, and the presumed date of infection can then only be a rough approximation. Thus tuberculous infection is rarely diagnosed by tuberculin tests at the time of occurrence. In view of this, the following observations made in the course of the Prophit tuberculosis survey appear to be of particular interest.

A number of persons who failed to react to either of the initial injections of tuberculin (0·1 c.cm. of OT 1/10,000 and 1/100) have, several weeks after the initial test, had a reaction at the site of the last tuberculin injection (1/100). The reaction is of the same character as that of the reaction normally visible in positive reactors 48–72 hours after the tuberculin injection. Moreover, it leaves a mark which may persist for several months, in the same way as a strong Mantoux reaction.

The reaction is not of the same type as the "torpid" reaction described by Pirquet (1909). The torpid reaction appears a few days later than the reaction normally observed, and was believed by Pirquet to indicate the existence of an old tuberculous lesion in the process of healing. Reactions of this type also have been seen in the survey.

Many of the delayed reactions pass unnoticed. During the past year, since this possibility was kept in mind, characteristic marks have been observed at the site of previous injections of OT 1/100 in people presenting themselves for retest 6 months or more after previous negative test; 5 of these, on being questioned, stated that they had noticed the reaction, and were able to give an approximate date of first appearance. The others had not noticed it. As routine procedure, therefore, all persons not reacting to tuberculin are now told of this possibility of delayed reaction, and are asked to report immediately they note any such reaction. One such case has been reported.

CASE-HISTORIES

In 14 cases the last Mantoux test before the delayed reaction was negative, and the test following the reaction was positive.

I—REPORTED AT THE TIME OF REACTION

CASE 1.—On Sept. 2, 1942, and Feb. 22, 1943, negative to OT 1/100. On April 1, 1943, 5 weeks after the last test, reaction at site of last injection: 10 mm. œdema, 20 mm. erythema. No symptoms. Temperature normal. X-ray examination: nothing abnormal. Blood sedimentation rate (BSR) 19. On April 15, Mantoux test: 2-plus to 1/10,000. BSR 23. Temperature normal. Warded with arthralgia of right knee. Inflammatory reaction round old scar of knee, and pain and swelling of joint. On May 11 knee normal; temperature normal. X-rays showed nothing abnormal. BSR 34. Refused further Mantoux test.

II—REACTION NOTED AT THE TIME BUT REPORTED LATER
(Cases 2–7)

CASE 2.—On Nov. 24, 1936, and Dec. 7, 1937, negative to OT 1/100. January, 1938, about 4 weeks after last test, œdema and erythema at site of last injection. Had a cold at the same time, with substernal pain. X rays showed round shadow in the right infraclavicular region. On June 2, 1938, Mantoux test: 2-plus 1/10,000. In January, 1939, suspicious shadow, left infraclavicular region. In May, 1939, both shadows much smaller.

CASE 3.—On Aug. 10, 1942, negative to OT 1/100. On Oct. 15, headache; feverish for a week. Temperature 102° F. for 2 days. On Nov. 15, 3 months after last test, œdema and erythema at site of last injection. Reaction lasted 7 days On Feb. 20, 1943, the mark of the reaction still visible, and the subject gave the history on being asked about it. Mantoux test: one-plus 1/1,000,000. X rays showed round focus, right mid-zone.

CASE 6.—On Aug. 10, 1942, negative to OT 1/100. In May, 1943, œdema and erythema at the site of last injection. On June 5 X rays showed enlarged root glands. On June 28 the mark of the May reaction was still visible. Mantoux one-plus 1/10,000. Patient complaining of cough. On July 16 X rays showed that the hilar glands were larger; there was a lesion at the left apex.

III—REACTION NOT NOTED AT THE TIME (cases 8–14)

Here, in people presenting themselves for retest, a characteristic mark was noted at the site of previous injection, the initial result of which had been negative. The reaction had passed unnoticed.

The main features of these cases are shown in the table.

Case	Interval between last neg. and :		First positive reaction: dilution	Symptoms before or at time of delayed reaction	X-ray findings *
	Delayed reaction	First positive			
	wk.	wk.			
1	5	32	++ 10,000	Nil	Nil
2	4	26	++ 10,000	Coryza, substernal pain	Round focus (6)
3	13	28	+ 1,000,000	Pyrexia	Round focus (28)
4	16	28	+ 10,000	"Gastric 'flu"	Nil
5	2	28	++ 10,000	Jaundice	Nil
6	30 (about)	43	+ 10,000	Cough	Enlarged hilar glands; focus lt. apex (46)
7	43 (about)	57	+ 100,000	Nil	Nil
8	?	30	+ 100,000	Cough, sputum, pyrexia	Diffuse shadow rt. base (19)
9	?	26	+ 100,000	Nil	Nil
10	?	28	+ 1,000,000	Nil	Nil
11	?	30	+++ 100	Nil	Nil
12	?	24	+ 1,000,000	Laryngitis, pyrexia	Nil
13	?	47	+++ 100,000	Cough	Nil
14	?	26	+++ 100,000	Nil	Nil

* The figures in parentheses show time, in weeks, since last negative test.

In one case observed a delayed reaction occurred in a person originally reacting only to OT 1/100.

CASE 15.—On Sept. 4, 1942, positive to OT 1/100 (i.e., negative to 1/10,000). In January, 1943, contact with tuberculous patients. A week later, erythema and œdema at site of last tuberculin injection. Feb. 22, 1943, Mantoux 2-plus 1/10,000.

All the above cases except one were nurses; case 2 was a medical student. Opportunities for observing this phenomenon have been greatest in the group of nurses, which is however only one of 5 groups included in the survey. Entrants to the survey have a tuberculin test and a chest radiogram once a year for 5 years; where the initial reaction is negative, the test is repeated 6-monthly till positive.

DISCUSSION

Delayed reaction after negative test (cases 1–14).—In all cases but one the test after the "delayed reaction" was positive to small doses of tuberculin (0·1 c.cm. of 1/10,000 or less). In 3 cases a primary focus was observed shortly after the delayed reaction, and in one case a diffuse shadow which may correspond to perifocal infiltration. Out of 7 subjects who observed the delayed reaction, 5 had other symptoms. In case 3, four weeks before the reaction, there were symptoms which may have corresponded to the primary infection. If this is so, the case is particularly interesting, showing the time lag between the infection and the development of allergy.

It is assumed that the delayed reaction observed in the cases reported occurs shortly after an infection, and the reaction to tuberculin still present in the skin occurs at the time tuberculo-sensitivity reaches a definite level. If this occurs often we have a number of possibilities of investigation into the circumstances of primary infection and the reactions of the individual at the time. Primary infection is usually not accompanied by symptoms of any note, and is therefore rarely detected at the time. The delayed reaction described marks the date of infection, or at least of development of sensitivity following infection.

A question arises here: can one say that in these cases tuberculin was retained in the tissues in the absence of previous infection? Or had the infection occurred before the last tuberculin injection, and had allergy developed to a degree high enough for the antigen-fraction of the tuberculin to be fixed intracellularly, but not yet high enough to produce the typical reaction? In the second eventuality, the skin reaction would develop later when tuberculo-sensitivity had reached a high enough level. In cases 3, 4, 6 and 7, however, this appears improbable since in these cases the interval between the last negative test and the delayed reaction is between 3 and 10 months. That a substance like tuberculin can be retained in the skin for a long time is borne out by an observation by Prof. G. S. Wilson (1943):

> A person who failed to react to an intradermal brucellin test, and who contracted undulant fever 2 years later, developed, at the time of the illness, a reaction at the site of the previous brucellin test.

Considering the number of tuberculin surveys carried out in America and Scandinavia, it is curious that cases of delayed reaction have been recorded so rarely. The only published cases found were as follows:

Janne (1939) wrote: "A student nurse had no reaction to three dilutions of OT until 6 weeks after the tests were done, [illegible] owed at the sites [illegible] red in the mean- [illegible] tuberculin. A subsequent tuberculin test substantiated the fact that infection had occurred. . . . This bizarre reaction was discussed with Doctor Long and most of the pathologists present, without securing an answer."

Malmros and Hedvall (1938) mention one case in which a reaction was observed two weeks after a negative test, and another case one week delayed. The latter may have been a torpid reaction. Hart, Hilton and Morland (1940) have reported a case which was the first one observed in the Prophit survey, and is reported above (case 2).

Any reason advanced for the relative frequency of the observations in the Prophit survey compared with other surveys must be purely speculative. First, it will be noted that all except case 2 were seen in 1942 or 1943—that is, since a point has been made of looking out for such cases. During [illegible] in the absence of [illegible] been noted. It is [illegible] such cases do occ[illegible] possibility is that certain tuberculins may be more slowly [illegible] tuberculin used in [illegible] his is true a wide [illegible] he lines of prepari[illegible] injection will ren[illegible] in initial negative reactors [illegible]

Wassen (1936, [illegible] along these lines. [illegible] paraffin was injected into the skin of two [illegible]ously [illegible] a re- [illegible] ntoux [illegible] film [illegible] Another subject reacted at the site of injection 6 months later, and the reaction slowly increased in size during the following year.

Delayed reaction after positive test (case 15).—The facts here are not in [illegible] culo-allergy. [illegible] or repeated co[illegible] shown [illegible] animals [illegible] whose [illegible] has been [illegible]

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1. The sample of tub[illegible] (Douglas and I[illegible] national standar[illegible]

sensitivity rises after superinfection much more rapidly than after their primary infection. It is therefore not surprising that in case 15 the reaction appeared as early as a week after fresh contact.

Observations of analogous character were made in early experimental work of Klingmüller and Slatinéano quoted by Bordet (1919). When, some time after a previous tuberculin test, tuberculin is introduced into the circulation, the site of local cutaneous or conjunctival reaction frequently shows a new inflammatory process. The "flare-up" ("anflammung") may also be produced by intracutaneous injection of tuberculin in the vicinity of the site of a previous tuberculin test. A similar phenomenon is the flare-up at the site of previous tuberculin tests in the course of tuberculin treatment.

SUMMARY

Delayed tuberculin reactions in 15 cases are reported. In 14 of these, the reaction developed between 2 weeks and 10 months after previous negative test.

The date of the infection responsible for the reaction may have been previous to the date of the last negative test; but it is more probable that in many of the cases infection had occurred since the last negative test and caused a reaction to tuberculin persisting in the skin.

If the second interpretation is correct, the reaction serves as a valuable indicator of "primary infection."

I am indebted to the Prophit Committee of the Royal College of Physicians for permission to publish this paper, and am particularly grateful to Prof. G. S. Wilson, Dr. P. D'Arcy Hart, and Mr. Percival Hartley, D SC, FRS, for helpful advice and *criticism*.

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EFFECTS OF ACCIDENTAL EXPOSURE TO MUSTARD-GAS VAPOUR

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As a result of an accident a number of soldiers were recently exposed to an unknown dose of mustard-gas vapour in their sleeping-quarters. Exposure was for a period of half an hour or less about midday, and continuous from about 6 PM. In addition three men were exposed for a time in the forenoon. One of these, at 7 PM, complained of stinging eyes, a blocked discharging nose, and temporal headache, which prevented him from going to sleep. Three others noticed smarting eyes, dryness of the throat, or slight cough about 9 PM. Most of the rest went to sleep.

Between 11 PM and midnight—that is after 5–6 hours' continuous exposure—many men wakened with symptoms; gas was suspected, and all were ordered downstairs. They complained of painful watering eyes, with photophobia and dimness of vision: some could not open their eyes. They had moderate to severe headaches, mostly frontal, which lasted several hours or longer. They vomited, often repeatedly for an hour or two, and they were dizzy. Their throats felt dry, or in a few cases slightly sore, and some of them felt constriction in their chests; they coughed, but only to a slight extent.

The men were given temporary accommodation for the night. In the early morning castor oil drops were placed in their eyes. Later they were stripped, washed, and transported to hospitals. The observations here reported concern 12 of them admitted to one hospital. Another 13 milder cases were treated at another hospital.

SIGNS, SYMPTOMS AND CLINICAL COURSE

On admission about midday the men were tired and apathetic but not shocked. Their pulses were rather [illegible] bounding, and their systolic blood-pressures [illegible] raised (116–142 mm. Hg), for the first day or two. Fever developed in half of them, with temperatures of 99°–100·6° F., not lasting longer than 3 days.

Skin.—Bright red erythema was present on faces and necks, the parts unprotected by clothing, sleeping-bags, or hair. In 3 cases it became more intense on the second day. However red, the skin was not itchy and not tender to pressure. Only in 1 case did vesicles appear—five tiny ones near one inner canthus. From the first or the second day the erythema quickly faded, disappearing in three to six days, leaving neither discoloration nor desquamation.

In 3 men fresh areas of erythema appeared on the fifth, sixth or seventh days in other places—the hands, the forearms, the antecubital fossæ, the axillæ, or the back of the upper chest. These areas were only moderately red; they itched or burned slightly; and in two days turned brownish, then faded, with slight desquamation.

Mouth, throat, larynx, trachea and bronchi.—On admission the men complained of dryness of mouth and throat, and in every case the soft palate, fauces and tonsils were intensely red and slightly swollen. These symptoms and signs subsided on the second and third days, but suddenly on the evening of the sixth day 10 of the 12 men developed burning pain in their throats, and distinct hoarseness, amounting in 2 cases to aphonia. These symptoms lasted, with diminishing intensity for, three to five days.

At the same time there was a little accentuation of the cough which was present in all the men from the time of admission and lasted into the second week. This cough was mostly nocturnal, and never severe, producing only scanty, mucoid or mucopurulent sputum. Occasional rhonchi indicated minimal involvement of the bronchial tree in a few cases, but no other pulmonary signs developed, and radiological examination of the lungs in 4 of the severer cases on the second and the fourth days showed no abnormality.

Eyes.—On admission discomfort in the eyes varied from smarting or aching to severe pain. The lids were œdematous and red, and in some cases the men were unable to open them, on account of swelling but not of blepharospasm. Those who could open their eyes had photophobia and dimness of vision. The conjunctivæ were injected and the flow of tears profuse.

On the second day discomfort and lid-swelling were less, but chemosis was noted in 2 cases, one of which also showed triangular whitish conjunctival opacities on either side of each cornea. In 4 cases there were milky transverse bands on the corneæ, visible to the naked eye, lying opposite the interpalpebral fissures; most of the rest showed faint corneal haziness.

On the third day the characteristic opaque white triangles had appeared in the conjunctivæ of another case, but in general the signs in lids and conjunctivæ were subsiding, the corneæ remaining unchanged. This improvement continued, but was interrupted on the seventh day by a transient exacerbation of ocular discomfort (stinging, smarting, or watering) in 5 of the more severely affected cases. In all but 2 cases the eyes had returned to normal in 2 to 4 weeks. None developed purulent conjunctival discharge at any stage.

Examination of the cornea with a loupe (by Prof. W. J. B. Riddell) on the fifth day showed some superficial corneal œdema in 9 cases, with slight staining by fluorescein in 2.

Treatment.—On admission 3 drops of 2½% sulphacetamide ('Albucid') solution was placed in every conjunctival sac. This was repeated 2 and 4 hours later. It gave appreciable symptomatic relief. Thereafter for 4 days 2½% sulphacetamide ointment was applied between the lids twice daily and for 10 days the pupils were kept dilated with atropine. During the first 2 days swollen eyelids in close apposition were gently separated by a nurse every hour or two to facilitate the escape of tears. Sulphadiazine was given for 4 days to the cases showing rises of temperature, and sedatives administered for nocturnal cough.

All of the men, with the possible exception of 2, could have been regarded under active service conditions as fit for duty by the tenth day.

COMMENT AND SUMMARY

These cases were examples of mustard-gas injury due to prolonged exposure (6 to 8 hours) to a low concentration of the vapour. They conform in general to the standard descriptions and were of slight to moderate severity. Among the clinical features, the following are worthy of note :—

1. Vomiting immediately and for some hours after exposure was repeated and severe, although cough was slight. It may be attributable to swallowed mustard vapour.

2. In the milder cases the initial erythema of skin and fauces, the pain in the eyes, the eyelid swelling and the conjunctival injection were maximal within 24 hours of exposure and thereafter declined. In the severer cases the skin erythema and the conjunctival changes (including chemosis and opaque white triangles) increased to a maximum on the second or the third days, and then declined.

3. Certain delayed effects appeared between the fifth and the seventh days—viz., erythema on areas of skin not previously reddened, sore throat and hoarseness or aphonia, and accentuation of cough and of smarting or watering of the eyes.

4. No secondary infection developed in conjunctivæ or lungs.

RETROGRADE AMNESIA

SOME EXPERIMENTS

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THE duration of amnesia *after* head injury has acquired practical importance as an index of the severity of the cerebral trauma (Symonds 1928), but retrograde amnesia (i.e., loss of memory for events preceding the accident) also remains an important clinical signpost. To the physician who finds the patient conscious, it is the first indication that the brain has been organically affected. Theoretically, too, there is interest in the paradoxical disappearance of material perceived at a time when the patient's faculties of observation and retention were still intact. It has long been known that retrograde amnesia follows not only trauma but many other forms of organic interference with cerebral function, such as suicidal attempts by hanging or gassing, and epileptic fits.

The general use of epileptiform convulsions for therapeutic purposes in psychoses provides a welcome opportunity of studying the phenomenon, making it possible to observe the　　an artificially produced　　ited several times in the　　to approach experimentally a problem which cannot be studied in animals.

Experiments of the kind to be described have been possible only since Meduna's original method of inducing the fit with an analeptic drug has been replaced by applying a short electric stimulus (Cerletti and Bini 1938). The preconvulsive period of anxiety and terror has thus been abolished, and objection and resistance of the patient to the treatment have become rare. All he remembers is that he has been put to sleep. Immediately after the convulsion he is confused and clouded for about half an hour and sometimes restless. This stage is followed in most cases by a short deep sleep. The further sequelæ vary a great deal. Some patients remain slightly drowsy and tired for as long as half a day, some only complain of headache; others are apparently well and resume their usual activities. Similarly the post-convulsive amnesia varies considerably.

METHOD AND SUBJECTS

Among the psychotic patients treated some selection was necessary in order to avoid those whose underlying psychosis might have interfered with the results of the memory test. All patients with impaired memory retention due to the underlying illness or to previous convulsion treatment were excluded, and all those whose full coöperation was doubtful. Most of those selected were depressives at a stage of beginning recovery, the rest schizophrenics and paraphrenics without acute symptoms interfering with retention.

for the treatment were completed, the patient lying on the couch with his headband fixed. Each picture was displayed for 15 seconds while the patient was told he should try to remember them. After 24 hours or less, but always in a condition of apparent recovery from the direct effects of the treatment, the subject was asked if he remembered any pictures and what they were. This test of "recall" was followed by a "recognition" test: he was asked to select the pictures he recognised from a series of 8–12 pictures among which the original ones were mixed. After some preliminary trials this standard procedure was found preferable to the display of a variety of visual and auditory material as used by Flescher (1941); moreover he extended the duration of testing to 5 minutes before the fit, which makes his results hardly comparable with those of the present study.

The simplicity of our test made remembering so easy that if an amnesia was found, its existence seemed beyond doubt; and on the other hand the time allowed before the convulsion was so short that we could count on detecting even the briefest retrograde amnesia. On the whole the patients liked looking at the pleasing pictures which distracted their attention from the alarming atmosphere of medical appliances and surrounding nurses.

RESULTS

Findings are based on 102 tests carried out in 46 patients. Recall of all 4 pictures was found complete only in 4 experiments performed by 2 patients. All others had forgotten some or all pictures when asked to recall them. Recognition was complete in 29 out of 102 tests which shows that retrograde amnesia is not a universal symptom after epileptiform convulsions. In a high proportion, however, some of the memorised material had been forgotten. If this indicates retrograde amnesia, more of the pictures shown first should be remembered than of those shown last. If the amnesia is patchy or uniform the first and the last shown pictures should be recalled or recognised in an equal number of experiments.

TABLE I—ANALYSIS OF PICTURES RECALLED AND RECOGNISED IN 102 TESTS OF 46 PATIENTS

Numbers	Picture 1	2	3	4
Recalled	43	41	30	22
Recognised	73	74	66	57

The　　tures, as given in table I, show　　owards the last picture both　　The difference between the number of remembered first pictures and that of remembered last ones is 21 for recall; this is four times the standard error of simple sampling which is 5. The difference in recognition is 16—3·5 times the standard error (4·6). The differences are therefore statistically significant; the amnesia is of the retrograde type. It may be added than when I asked the patients who recognised the whole series (29　　the order in which the picture　　larly the third and fourth pi　　were uncertain or mistaken.

Another result illustrated in table I is the greater number of pictures recognised than of pictures recalled. On the average, in the recognition test the amount of remembered material was double that in the recall test.

TABLE II—ANALYSIS OF PICTURES REMEMBERED IN 43 TESTS AFTER 3–8 HOURS AND IN 59 TESTS AFTER 24 HOURS

Numbers		Picture 1	2	3	4
Recalled	after 3–8 hrs.	23 (53)	20 (46)	12 (28)	8 (18)
	after 24 hrs.	20 (34)	21 (35)	18 (30)	14 (24)
Recognised	after 3–8 hrs.	37 (86)	37 (86)	32 (74)	25 (58)
	after 24 hrs.	36 (61)	37 (63)	34 (57)	32 (54)

The figures in parentheses are percentages

To assess the influence of the time of testing on the extent of retrograde amnesia the experiments were divided into two groups. Of 102 tests, 43 were carried out 3–8 hours after the fit, and 59 after 24 hours had elapsed (table II). If one takes the difference between the first and last picture as a measurement, retrograde amnesia certainly seems much commoner if tested for earlier; recollection seems 3 to 5 times better after 3–8 hours than after 24 hours. On closer scrutiny, however, one realises that this difference is to a large extent due to better recollection of the first picture after a shorter interval and that the difference between the number of remembered last pictures is insignificant. All one can say from our experiments is that the first pictures are definitely better remembered a few hours after the fit than after 24 hours and that the last picture does not share this advantage. However this may be interpreted, the figures show that it is not a matter of indifference at which time the patient is tested for retrograde amnesia.

DISCUSSION

From the results of these experiments the existence of retrograde amnesia as a primary symptom after epileptiform convulsions seems established. The fact that it was present in circumstances incomparably more favourable to remembering than those of an accident leading to a head injury removes a number of theories of retrograde amnesia from discussion. Thus the theory that the events preceding many accidents are forgotten because of their routine and casual character, can be discarded since retrograde amnesia was found for memorised material. Then the length of the memory gap *following* the accident cannot be held responsible; this gap never lasted more than a few hours in our experiments. The idea that circumstances of an accident are suppressed from memory because of their unpleasantness, or because of guilt feelings, the symptom being explained as secondary to emotional factors, is not supported by our findings. Even if some of the displayed pictures were remembered or forgotten because of likes or dislikes of the patients, such predilections would have been balanced in so large a series of subjects and of experiments. Special care was taken to change the pictures often and to vary the order of display.

The current view prevailing among neurologists and psychiatrists is that the cerebral injury destroys the traces or "engrams" of the immediately preceding impressions. Apart from the difficulty of accounting for a selective blotting-out by a disturbance affecting the whole of the cerebral cortex, the difference found between the tests of recall and recognition in our experiments is strongly against such a theory. The recall test closely resembles the questioning of the patient by the examining physician after an accident. Its results, as the figures show, could be greatly improved on in the recognition test. Similarly, Klein and Kral (1933–34) were able to reduce the retrograde amnesia after accident in one of their patients by reconstructing the situation before the accident. Such improvement would be impossible were the traces destroyed by the cerebral injury.

In other words, the apparently lost memory material obeys the normal rules of reproduction according to which recognition is always easier to recall. To arrive at a more satisfactory theory it seems appropriate to make use of a principle of normal psychology dealing with a similar phenomenon in memorising and learning—that of "retro-active inhibition" (Mueller and Pilzecker 1900). This depends on the well-known rule tested in numerous experimental studies that memorised material is better remembered if the learning of it is followed by an idle interval; and that mental or physical effort immediately after learning disturbs its recollection. In spite of its name (which has often been criticised) there is nothing to prove that retro-active inhibition acts backwards. One of the most favoured explanations of the principle is that learning is followed by a period of gradually diminishing activity of neural processes which intensify the associations established in the learning. If this "after-discharge" of neural elements consolidating the memory pattern (Britt) is interfered with by an interpolated activity, the memorised material is not so well remembered. The application of this well-established mechanism and of its explanation to retrograde amnesia is obvious: the cerebral injury prevents the latest memory traces, which are still in the process [illegible]lation, from being properly formed and organised. Thus retrograde amnesia can be regarded as an extreme case of retro-active inhibition.

As an explanation of retrograde amnesia the idea is not new. In 1875 Hamilton interpreted it as follows: "In order that a recollection may organise and fix itself, a certain time is necessary which in consequence of the cerebral excitement does not suffice" (Hack Duke 1892). That the theory corresponds to teachings of modern psychology should make it more acceptable.

It seems, however, difficult to suppose that consolidation of memories should be a process lasting over days or weeks, and therefore, according to this theory, retrograde amnesia should be short. In fact, its brevity in our experiments is striking. In only 10 instances out of 102 did it extend over one minute. Investigators of large numbers of patients with head injuries have pointed out that retrograde amnesia for days or weeks is extremely rare. Russell (1932) found a duration of more than 24 hours in only 4 out of 180 cases, and in most of his patients it lasted a few seconds or minutes only; among another series of 500 head injuries he found only one with a permanent retrograde amnesia extending backwards over one week.

The qualification "permanent" turns on the observation that retrograde amnesia after cerebral injury often shrinks with the time elapsing after the accident. Comparison of test results after 3–8 hours with those after 24 hours (table II) is suggestive of a shrinkage, but does not clearly prove it. Perhaps 24 hours is still too early for testing the "permanent" retrograde amnesia and a later test would have revealed a diminishing amnesia. It may be that retrograde amnesia after induced convulsions is generally too short to give clearer insight into this point. On the other hand, the difference in the results of the two groups of tests, especially in remembering the first picture, shows that retrograde amnesia is undergoing some change during the first day after the trauma; this change is probably not one of the memorised material, but of the ability to reproduce it. Cerebral efficiency in general is definitely impaired immediately after the convulsion, as is shown by confusion and cloudiness lasting an hour or more. It seems not to be completely restored at a time when clinically the patient is apparently recovered.

In patients with head injuries there is a parallel to the fuller recollection of the first picture in the early test: patients occasionally reproduce, in post-traumatic drowsiness, details of the accident which they have forgotten when they regain consciousness. This event, illustrated in Russell's cases, can have medicolegal consequences; and it defies all theoretical explanations.

Among the questions left unanswered by the present investigation is that of the individual differences between our subjects' retrograde amnesia. Many were tested several times, each seemed to keep to his own type of remembering or forgetting the picture series. As mentioned before 2 had remembered everything and in 6 patients (10 experiments) the amnesia was longer than one minute. Others recalled little, but recognised all pictures; in others, again, recall and recognition were rather similar in distribution; and so on. Individual differences in patients with head injuries are easily explained by the different severity of the cerebral damage and by its localisation. The electrically induced epileptic seizure, however, seems to vary so little in its clinical symptoms and in its duration from case to case, that one is forced to surmise an unknown personal factor influencing the extent of retrograde amnesia—a factor which may play its part in post-contusional cases as well.

SUMMARY

In patients experiencing electrically induced convulsions retrograde amnesia was found for material memorised during the last minute before the fit.

Patients more often showed retrograde amnesia for the recall of material than for its recognition.

In only one-tenth of the experiments was retrograde amnesia longer than one minute.

The time-interval between fit and test influenced the results of testing. Shrinking of retrograde amnesia, though suggested by the difference in findings, could not be plainly demonstrated.

In contrast to the idea that retrograde amnesia is caused by the destruction of memory traces, the theory

is proposed that the cerebral injury interrupts the consolidation of recent memories. This is analogous to the phenomenon of retro-active inhibition in normal psychology.

I gratefully acknowledge the valuable advice of Dr. Eric Guttmann, Dr. F. Kräupl's help with statistics and the encouraging criticism of Dr. P. K. McCowan, physician superintendent of the Crichton Royal Hospital.

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RESECTION OF SMALL INTESTINE IN AN INFANT THREE WEEKS OLD

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INGUINAL hernia is common in small children, and in 5–7% [illegible]). Strangulation, howev [illegible] f inguinal hernia record [illegible] (1938), 106 (6 %) were [illegible] resection of the intestine; and among the 1000 cases of Herzfeld (1938), only one, a baby 12 days old, needed resection. At the Hospital for Sick Children, Great Ormond Street, since the beginning of 1938 408 cases of inguinal hernia have been operated on: 6 were irreducible (1 3%) and in only 2 of these was intestinal resection necessary.

It is a common be[illegible]y has a mortality-rate of [illegible] cases *treated at Great O*[illegible]quire resection of small intestine died on the 14th day with numerous intraperitoneal abscesses, apparently secondary to leakage from the anastomosis. The second, however, recovered.

The child was a firstborn full term male delivered on Nov. 7, 1942, after a normal labour; his birth weight was 6 lb 5 oz. and he was breast fed. On Nov. 25 he began to vomit and ceased to pass motions. Two days later the mother noticed a lump in his right groin and he was admitted to hospital.

By that time he was ill, pale and dehydrated, and was crying continuously. The abdomen was distended and tense and the umbilicus prominent. From the right groin a large [illegible]

stipation

Just before operation 3½ hours after admission a stomach-tube was passed to empty the stomach. After its removal, [illegible]

gangrenous After dividing the constricting band at the neck of the sac, the gangrenous portion with adjacent healthy bowel (4 in. in all) was resected. The ends of the proximal and distal segments of the intestine were then ligatured, the stumps being invaginated with a catgut purse string suture on an atraumatic intestinal needle. A side-to side anastomosis was next performed; no intestinal clamps were used, the loops of the intestine being held by the assistant's fingers; 0/0 catgut on an atraumatic intestinal needle was employed. The anastomosis was performed in the usual way so that there were two layers of sutures A sucker was used for removing the contents of the gut which tended to escape. The length of the anastomosis was ¾ in. Omentum was not wrapped round the suture line and sulphanilamide powder was not applied

While the anastomosis was being formed the child vomited and stopped breathing. A stomach tube was passed and the stomach again emptied; oxygen and nikethamide ('Coramine') were administered and he revived. When the intestines had been replaced in the peritoneal cavity, the peritoneum was closed with a single purse-string catgut suture to hold back the abdominal viscera. *No attempt was made to repair* the hernia [illegible] a firm pad w[illegible]

After oper[illegible] but received glucose saline by intravenous drip at the rate of ¾ oz. per hour. When fæcal vomiting began again at midday next day (Nov. 28) an ordinary stomach-tube was passed and attached to a continuous suction apparatus, working at a negative pressure of 1½ in Hg. Much fæcal material was obtained through this tube. A normal stool was passed 44 hours after *operation, and 4 hours later feeding* by mouth was commenced, starting with 1 drachm of glucose-water hourly and increasing by a drachm every 4 hours The suction was stopped for half an hour after each feed and then restarted: it was finally discontinued 54 hours after operation. Intravenous infusion was continued for 2½ days. Breast milk feeds were slowly introduced and on the 7th day the child was back on the breast and taking his feeds well. Apart from some suppuration in the wound and a boil on the buttock recovery was thereafter uneventful

Four factors may have helped this baby to survive. (1) Great care was taken over the anastomosis, but otherwise the operation was performed as quickly and as simply as possible: there was no attempt at a repair. (2) By holding the bowel in fingers instead of clamps, a minimum of trauma was inflicted on the bowel. (3) All feeding by mouth was stopped for 2 days after the operation, the fluid intake being maintained by continuous intravenous infusion of glucose-saline. (4) The proximal part of the alimentary tract was kept empty by continuous suction through a stomach-tube for 2 days.

My thanks are due to Mr Graham Humby for permission to publish this case.

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PERFORATION OF RECTUM FROM IMMERSION BLAST

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IN March, 1941, when a cruiser was torpedoed in the [illegible] seaman, aged 28, was [illegible]yers were dropping depth [illegible] and one exploded near [illegible]w—he remembered *being* [illegible] picked up, and 14 hours [illegible]uiser was admitted to a hospital ashore.

On admission to hospital the patient showed no external [illegible]

100 F. and pulse rate 120 per min. He had not vomited. The abdomen was rigid *all over, more especially in the right iliac* fossa. There was no distension. On auscultation of the abdomen there was complete silence. A rectal examination was not done, as it was thought further damage might be done to the injured part.

*After a preliminary infusion of saline and glucose, a laparo*tomy was performed under oxygen and ether anæsthesia. A left paramedian incision was made and pus was seen in the peritoneal cavity. The first part of the rectum on its anterior surface showed a lacerated bruised perforation about 1 cm. in *diameter. The rest of the rectum appeared healthy and* normal. The perforation was oversewn and buried with a purse string suture. The abdominal contents were rapidly searched for any further injuries, but none was found. A pelvic colostomy with a long spur was made. The pelvis was *drained and the abdomen closed. A transfusion of 2 pints of* blood was given. His condition was poor at the end of the operation.

Next day there was well-marked jaundice and his condition deteriorated. On the third day paralytic ileus became evid- [illegible]

pelvis, with paralytic ileus involving the whole small bowel.

There was an enlarged septic spleen. The right lung showed a contusion on the anterior surface near the medial and inferior margins; hypostatic congestion was present at both bases. No evidence of internal hæmorrhage was found. The heart, kidneys and liver appeared normal macroscopically. Evidence of a rupture some ½ in. in length in the rectum was found; this had been stitched together and was in the process of healing.

Here is a case of blast abdomen causing intraperitoneal perforation of the first part of the rectum, due, as Williams [1] has very reasonably conjectured, to a pressure wave travelling in a fluid medium meeting a gas-containing organ. Williams in his experiments showed that the commonest effects of blast injury to the abdominal contents were subperitoneal and submucosal effusions of blood. This case showed no subperitoneal hæmatomata, but unfortunately the mucosa of the alimentary tract was not examined post mortem.

Several cases have now been described where, after immersion blast injury, severe abdominal pain and melæna have been present, and recovery has taken place without operative interference. In these cases, presumably, the pathology was that described by Williams. However, resolution does not necessarily occur, and the condition may progress to necrosis and secondary perforation.

This case is of interest in that perforation of the rectum was a primary event in a single organ, with no evidence of other abdominal injury.

Reviews of Books

Cunningham's Text-book of Anatomy

(8th ed.) Editors: J. C. Brash, MD BIRM., FRCSE; E. B. Jamieson, MD EDIN. (Oxford University Press. Pp. 1558. 60s.)

This book has developed steadily as a reliable guide to the student, and a few criticisms may therefore be offered in a helpful spirit. The section on craniometry is not of great use to the medical student, but in any case it would be well to omit Huxley's obsolete classification of skulls into cryptozygous and phænozygous, since under which of these two any skull falls depends entirely on the distance from which it is viewed. The section devoted to the morphology of the limb bones contains one or two debatable statements, and in the section of myology the remark that "When the teeth are tightly clenched, the hyoid bone will be found firmly fixed" seems to be invalidated by the fact that swallowing can be performed with the teeth clenched. In one of the new figures the mucous glands of the palate are depicted well forward on the hard palate and lying along the middle line; the text, however, correctly states that these glands are situated "in the posterior half of the hard palate, except near the raphe." Another attractive new illustration (fig. 374), which might lead one to suppose it had been drawn from an actual specimen, shows the membranous layer of the superficial fascia of the abdominal wall joining with the deep fascia of the thigh along the line of the inguinal ligament. In the text it is described as joining "just distal" to the ligament. In Cunningham's *Manual of Practical Anatomy* the line of fusion is described correctly. Correlation between the *Manual* and the *Textbook* again fails in the account of the descent of the testis; the student who, it is to be hoped, has encountered the correct figures in the *Manual*, will be disconcerted to meet incorrect ones in the *Textbook*. Attention is drawn to these little oversights only because "Cunningham" has grown so trustworthy in general. It has also grown in size and in cost, weighing nearly six pounds and costing three.

Essentials of Gynecology

Willard R. Cooke, MD, FACS, professor of obstetrics and gynecology, University of Texas. (Lippincott. Pp. 474. 42s.)

Professor Cooke has concentrated on pathology in the conviction that in gynæcology intelligent judgment is impossible without a working knowledge of it. The text is illustrated by photographs; those showing macroscopic appearance are good, and so are most of the photomicrographs, but a few are poor and deserve to be replaced in future editions. An unusual but valuable chapter is devoted to the patient herself, her mode of life [illegible] chology. Another long chapter deals with [illegible] disturbances. Stating that 95% of human suffering is mental, Dr. Cooke rightly observes that the removal of a bleeding fibromyoma may actually make the patient subjectively worse if she is left to welter in fear and apprehension as to the end-results of the operation. The chapter on operative gynæcology is not intended to serve the needs of the surgical specialist but to provide the practitioner with a working knowledge of preoperative and postoperative care. In contradistinction to the care and attention directed to the subjects mentioned above, the treatment of the so-called "minor" ailments by the patient's own doctor deserves more detailed attention than it receives. In the section on the treatment of dysmenorrhœa presacral sympathectomy claims almost as much space as all other methods of therapy combined. With these few exceptions this is a sound work and it has been beautifully produced.

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[1] 1. Williams, E. R. P. *Brit. J. Surg.* 1942, 30, 38.

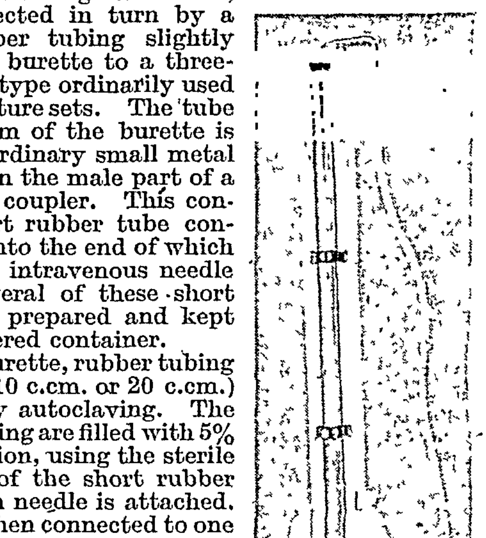
New Inventions

APPARATUS FOR ADMINISTRATION OF SMALL DOSES OF PENTOTHAL

Many anæsthetists now use 'Pentothal Sodium' for the induction of general anæsthesia. This procedure is sometimes difficult under war conditions because of the demand it makes on the available syringes. With the apparatus here described small induction doses of 5% pentothal solution can be given to four or five patients with one sterile syringe.

The apparatus illustrated in the figure consists essentially of a plain glass burette connected to a piece of small-bore rubber tubing about 18 in. long. The burette is corked with a rubber stopper, through which passes one arm of a small-bore glass U-tube, which is connected in turn by a length of rubber tubing slightly longer than the burette to a three-way tap of the type ordinarily used in lumbar-puncture sets. The tube from the bottom of the burette is fitted with an ordinary small metal tap, and ends in the male part of a male to female coupler. This connects to a short rubber tube connector (4 in.), into the end of which the butt of the intravenous needle is forced. Several of these short connectors are prepared and kept sterile in a covered container.

For use the burette, rubber tubing and a syringe (10 c.cm. or 20 c.cm.) are sterilised by autoclaving. The burette and tubing are filled with 5% pentothal solution, using the sterile syringe. One of the short rubber connectors with needle is attached. The syringe is then connected to one of the open arms of the three-way tap. The tap is turned, so that when the plunger of the syringe is withdrawn air is drawn in through the other side arm into the syringe. The tap is then turned so that the syringe makes connexion with the rubber tubing leading to the top of the burette. The needle is inserted into the patient's vein and the tap in the delivery tube is opened. Air is injected into the top of the burette by advancing the plunger of the syringe, and displaces an equal volume of pentothal, which is delivered into the vein. The required amount of pentothal having been delivered, the tap in the delivery tube is closed and the needle withdrawn. The short connector is removed and discarded. The free end of the delivery tube is wrapped in a sterile gauze swab wet with alcohol and placed in a sterile test-tube. The syringe is left in place. For subsequent patients a fresh sterile needle and short connector is attached.



R. A. Gordon, MD TORONTO, DA
Major, RCAMC

THE LANCET

LONDON: SATURDAY, NOVEMBER 13, 1943

NO RECOVERY NO GRANT

MR. BEVIN's dramatic announcement early in the 'ear that those who drop out of employment as a esult of tuberculous infection are to have precisely he same chance of getting back into it as those who lave suffered wounds or accidents seemed too good o be true. In one respect it was, for the MINISTER 'F HEALTH has ruled that the Exchequer grant is to nable persons to give up work temporarily "for reatment which is in the interest of the public ealth no less than their own." Only those are ligible whose recovery is sufficiently sure to make hem a realisable asset to the man-power of the ation in war-time. On the tuberculosis officer alls the invidious task of drawing the line. If he ays "no recovery" the Exchequer says "no grant": nd the patient loses both the money and the incenive to get well. It is true that in any case he may eceive money through the local authority which can, nd ultimately indeed must, provide assistance when he Exchequer refuses it; indeed in some places it eems that such assistance is not far short of the rant. But it is not just a question of accounting; he press has been full for weeks of the bitterness reflected in our Parliamentary column this week) vhich is being aroused by the distinction between ecoverable and irrecoverable disease. The line is mpossible to draw with any accuracy. It had to be rawn for sanatorium benefit in the unhappy period efore the Public Health Act of 1921 swept it away. 'uberculosis officers are not infallible and there are orderland cases in which the encouragement of a rant might well turn the scale towards recovery. 'here is a feeling too that the MINISTER himself egretted the reservation, as it was not mentioned in is explanatory leaflet to the public; moreover the remature discharge of the grantless from hospital r sanatorium must be contrary to the public health, n which he lays such stress. Do not the invidiousess and the unhappiness and the increased risk of nfection outweigh any small saving of public money? Jnless the scheme is made comprehensive, in accordnce with its first intention, shall we not drift into he position that the state only helps the sick civilian n proportion to his capacity to return the help in ervices rendered? On the field of battle we do not ive priority treatment to the casualties who are xpected to fight again.

DRUGS AND THE EEG

THE electro-encephalogram is an excellent, and ossibly the best, physiological gauge of depression f the highest cerebral functions. Impairment of onsciousness or increased attention is reflected in a hift of energy distribution towards the slow or fast nd of the cortical frequency spectrum. Drugs which ffect consciousness modify the EEG, so that the EG gives us an objective method of studying one spect of drug action, but the modifications are difficult to describe without the assistance of automatic frequency analysers. The human visual an- [illegible] changes in potential distribution which most drugs produce are readily overlooked. But the advent of apparatus for automatic frequency analysis in America,[1] and now in England,[2] has made the accurate assessment of changes in cortical frequency reasonably easy, and drug action on the EEG is now being studied in detail.

Working with a Grass frequency analyser, GIBBS and MALTBY[3] found, as was expected, that the drugs known clinically as depressants or stimulants can be sorted into the same two groups by the EEG changes they produce. Thus morphine, 'Pentothal' and phenobarbitone redistribute energy towards the slow end of the spectrum, whereas caffeine, amphetamine ('Benzedrine') and adrenaline cause a shift towards the fast end. In their effects on the EEG, therefore, the depressant drugs are comparable to normal sleep and the stimulants to attention. Of the drugs studied, pentothal, which produced the greatest clinical depression, caused the greatest shift towards the slow end of the spectrum, and adrenaline produced both the greatest clinical stimulation and the greatest shift towards the fast end, amphetamine coming next and caffeine third. In this way the activity of drugs with a similar action can readily be compared.

In cases of petit mal, WILLIAMS and RUSSELL[4] have studied in the EEG the effect of anticholinesterases on epileptic activity. In small doses eserine tended to prevent attacks, while in larger ones it increased their frequency and duration. 'Prostigmin,' on the other hand, invariably increased epileptic activity as seen in the EEG, and reversed the effect of small doses of eserine. WILLIAMS[5] used the same technique to investigate the effect of other substances known to modify transmission at cholinergic endings. Intravenous injection of acetylcholine was followed by an increase of epileptic activity, and this effect was abolished by atropine. Since eserine, prostigmin, carbaminoylcholine chloride and acetycholine have a similar action on cerebral rhythms in epileptics which is abolished by atropine, it seems likely that this action is related to an alteration in the acetylcholine-transmitting mechanism in the body; but WILLIAMS points out that the effect may be an indirect one, due to peripheral changes, since the effects of choline-like substances are so widespread and complex. CHATFIELD and DEMPSEY[6] applied acetylcholine and prostigmin locally to the cortex of cats. They found that acetylcholine alone produced no change in the cortical rhythms and prostigmin a transient depression of spontaneous activity at the area of application. When prostigmin was followed by acetylcholine a characteristic series of changes occurred. There was first an increase of spontaneous activity, then an increase of low-voltage 20–30 cycle rhythms which spread over the whole cortex while the amount of 5–10 cycle rhythms decreased. The effect of a single peripheral stimulus on this preparation was to

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1. Grass, A. M. and Gibbs, F. A. *J. Neurophysiol.* 1938, 1,
2. Walter, W. G. *Electronic Engineering*, June, 1943.
3. Gibbs, F. A. and Maltby, G. L. *J. Pharmacol.*
4. Williams, D. J. and Russell, W. R. *Lancet*,
5. Williams, D. J. *J. Neurol. Psychiat.* 1941,
6. Chatfield, P. O. and Dempsey, E. W.
   135, 633.

leave the cortical response unchanged, but when repeated stimuli were given the cortical response was increased. All these effects, except the low-voltage fast activity, were abolished by section of the thalamic radiations, and from this **Chatfield** and **Dempsey** argue, first, that low-voltage fast activity is intrinsic to the cortex itself, not requiring thalamic circuits, and secondly, that since activity associated with spontaneous bursts and continuous 5–10 cycle rhythms is abolished by removal of the thalamus, such effects represent activity of thalamo-cortical circuits. However this may be, it is evident that the application of EEG technique to the study of the action of drugs on the central nervous system may well advance our knowledge, not only in pharmacology but also in neurophysiology and clinical medicine.

HÆMOLYTIC FACTORS

It is not difficult to show that excessive hæmolysis, or destruction of red blood-cells in vivo, is the characteristic feature of an anæmia. But when we have diagnosed "hæmolytic anæmia" we have not got much further; in order to treat that anæmia, the reasons for the hæmolysis must be known. The antibody reactions connected with the Rh factor of **Landsteiner** and **Wiener** have been proved responsible for some at least of the hæmolytic anæmias of infancy; but, apart from certain known hæmolytic poisons, this is so far the only hæmolytic group about which we have certain information. When spherocytes were demonstrated in the blood of patients with familial acholuric jaundice, it was suggested that these cells were being produced by a disordered bone-marrow and were abnormally fragile, the fragility being measured by testing with hypotonic saline solutions. Further research, however, has shown that spherocytes can be produced by artificially induced hæmolysins, and they have been found in other conditions. **Dameshek** and **Schwarz**,[1] using such artificial hæmolysins, reproduced a whole series of hæmolytic anæmias corresponding to most of the known syndromes, but it has nearly always been impossible to demonstrate any circulating hæmolysin in human hæmolytic diseases.

This fragility of the red blood-cells has been elaborately studied, not only with hypotonic saline but also with a substance known as "lysolecithin" which is thought especially to affect red cells held in the spleen. Estimation of "lysolecithin fragility" is difficult but has been done because in some hæmolytic conditions the red cells show an increased lysolecithin fragility but a normal fragility in saline. One of these conditions is blackwater fever, which has been extensively studied because of its severity and its danger to life and because it is a pattern of hæmolytic disease. **Foy** and **Kondi**,[2] like others before them, report that the lysolecithin fragility is undoubtedly increased in this disease, but they can make little use of the information; they cannot accept the thesis that blackwater fever is due to some effect of the malarial parasites on the erythropoietic tissues of the victim, since they showed before[3] that normal red cells transfused into blackwater fever patients are destroyed in exactly the same way as the patient's cells, so that no fundamental defect in the red cells can be assumed. They also found that though lysolecithin has a hæmolytic action in vitro, no such action can be demonstrated in vivo.

It cannot honestly be said that these often difficult and elaborate studies of red-cell fragility have helped to explain the mechanism of hæmolysis, although we have learnt a lot from them about the properties of the red cell itself. Is it possible that we are asking the wrong questions and so receiving, in Nature's offhand way, no sensible answers? **Maegraith**, **Findlay** and **Martin**[4] have started a new approach to the problem of blackwater fever hæmolysis that may prove more fruitful. They have shown that slices of human tissues contain a factor that will lyse saline suspensions of red blood-cells; human serum, on the other hand, contains a factor that inhibits this lysis, and in blackwater fever they found that the inhibitory power of the serum is much reduced. They therefore suggest that there is no abnormal lysin in the blood of blackwater fever patients, "the lysis is simply a manifestation of excessive uninhibited activity of a normal lytic process." These findings await confirmation but sound promising; material for study is, unfortunately, easy to come by.

NO PLACE LIKE HOME, BUT . . .

The return of the repatriated prisoners from Germany offers the War Office and the Ministries of Labour and Pensions an opportunity for a large-scale experiment in social rehabilitation before they are called upon to meet the more massive problems which will follow the end of the war in Europe. The training of the physically handicapped man, so that he can take his place in the industrial world, is familiar work to the Ministry of Pensions. But the mental state of the repatriated prisoner is a more subtle matter. There will of course be the gross casualties—the man who returns to find his family has perished in the blitz or has disintegrated for other reasons; but such cases will be few. In the prison camp, every prisoner will have built up a mental picture of home, and this fantasy may bear little relation to the real thing. After highly emotional episodes, life for all of us is apt to seem dull and flat. For the repatriated prisoner, this anticlimax will coincide with a realisation that home is not without its drawbacks and irritations. It would not be unreasonable to predict the development of something in the nature of a reactive depression, which will call for careful handling. After a brief holiday, a return to kindly but firm discipline might not come amiss, coupled with a steady increase in physical work. Interest in current affairs might be reawakened at the same time by lectures and discussion groups. Some may feel, however, that the man has a better chance of working out his own salvation in the cold hard world. We have a chance to try out both methods. If two groups of repatriated prisoners could be treated along these lines, with adequate psychiatric observation of both groups, they might well provide the necessary data for planning the mental rehabilitation of the other prisoners of war.

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eshek, W. and Schwarz, S. O. *Medicine* (Baltimore), May, 0, p. 231.

H. and Kondi, A. *Trans. R. Soc. trop. Med. Hyg.* 1943, 37, 1.

1941, ii, 530.

[4] Maegraith, B. H., Findlay, G. M. and Martin, N. H. *Ibid*, 1943, i, 573.

The next session of the General Medical Council will open on Tuesday, Nov. 23, at 10 AM

Prof. L. G. **Parsons** will deliver the first Charles West lecture at the Royal College of Physicians of London next Tuesday, Nov. 16, at 2.15 PM. He will speak on the prevention of neonatal disease and neonatal death.

Annotations

AN ANTIBIOTIC FROM ASPERGILLUS

SINCE the discovery of penicillin by Fleming and its exploitation by Florey and his colleagues, systematic search has been made through large numbers of moulds and similar organisms for substances with antibacterial activity. In addition to gramicidin, which had been discovered earlier by Dubos, several compounds of different types have been brought to light, such as pyocyanin and notatin. The latest to be described comes from *Aspergillus fumigatus* mut. *helvola* Yuill. Antibacterial activity was reported from the culture filtrates of this fungus by Wilkins and Harris[1] and the active substance in a crystalline state has been isolated by Chain, Florey, Jennings and Williams[2] who give a detailed account of its chemical and biological properties. It seems to be a monobasic acid with the probable empirical formula $C_{32}H_{44}O_8$, and has been named helvolic acid; though soluble in most organic solvents it is insoluble in water, though its sodium salt is freely water-soluble. It is thermostable and stands boiling for 15 minutes. Helvolic acid is distinct from the substance isolated by W[illegible] of 1:100,000 to 1:1,000,000 it prevents the growth of staphylococcus, pneumococcus, *Strep. pyogenes*, *B. anthra-is*, *C. diphtheriæ*, *Cl. welchii* and others, but it fails to check typhoid, dysentery or coliform bacilli, proteus or *Ps. pyocyanea*. The dilution at which it inhibits growth depends greatly on the size of the inoculum used, small numbers of bacteria being checked much more readily than large ones. Its action is predominantly bacteriostatic: it prevents multiplication but does not kill the germs. This effect is not inhibited by *p*-aminobenzoic acid, by pus, tissue extracts or peptones; so that it is clearly differentiated from the inhibition due to sulphonamides. Bacteria cultivated in the presence of subeffective concentrations rapidly become drug-resistant and are no longer susceptible to the action of the compound; but such helvolate-resistant organisms are still susceptible to penicillin. Helvolic acid is not unduly toxic to mice, the maximum tolerated dose of the sodium salt by intravenous injection being about 5 mg. per 20 g. body-weight; much larger doses are tolerated by mouth. Leucocytes are not affected by concentrations up to 1:1600, and tissue cultures tolerate concentrations of 1:2500 for 48 hours. Some of it may persist in the blood of mice for 6–10 hours after administration. It is slowly absorbed along the whole length of the gastro-intestinal tract and there seems to be no destruction of it by bacteria in the lumen of the gut; it is gradually excreted in the urine and bile. In the tissues it becomes concentrated, chiefly in the liver, and only traces were found in the spleen; apparently it does not pass easily from the blood to the cerebrospinal fluid. When injected intravenously into a cat it had no significant influence on the cardiovascular or other systems: no symptoms were caused by moderate doses injected intracisternally into rabbits. Its chief toxic effect seems to be on the liver, large or repeated doses causing extreme vacuolation and finally destruction of hepatic cells. In face of so much chemical, bacteriological and pharmacological information it is disappointing to learn that its therapeutic action in vivo is small. Mice were infected with staphylococci or streptococci and an hour later treatment with helvolate was begun. The life of the mice was undoubtedly prolonged, but complete cures were few. These tests were performed on only a small number of animals, and it may be that a different dose-schedule might give better results. Yet even if helvolic acid itself proves to have little clinical value it belongs to a group of substances hitherto unexplored for antibacterial properties; and chemical modification of the molecule may yield compounds much more active and no more toxic.

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1. Wilkins, W. H. and Harris, G. C. M. *Brit. J. exp. Path.* 1942, 23, 166.
2. Chain, E., Florey, H. W., Jennings, M. A. and Williams, T. I. *Brit. J. exp. Path.* 1943, 24, 108.
3. Waksman, S. A., Horning, E. S. and Spencer, E. L. *Science*, 1942, 96, 202; *J. Bact.* 1943, 45, 233.

SILICOSIS IN SWEDEN

SILICOSIS was added to the list of occupational diseases in Sweden in 1930. From 1934 onwards, Bruce[1] carried out surveys in various industries in which a risk of silicosis was suspected, and investigated silicotic workers clinically, assessing the disability at various stages of the disease. Altogether, 6500 workers in Sweden are estimated to be exposed to a silicosis risk, about half of these in mining, chiefly of iron ore. Iron and steel production and ceramics account for the bulk of the remainder. About 40% of all these workers were examined and X rays were taken of two-thirds of them. Bruce classifies the X rays according to the three stages defined by the 1930 international conference, but adds a fourth category of suspected silicosis, characterised by linear or reticular shadows. He pays particular attention to the incidence of tuberculosis and its relation to silicosis. The industries surveyed covered ceramics, iron and steel work[illegible] stone quarrying and [illegible] and mining. In sev[illegible] was repeated after 3–5 years, or earlier results obtained by other investigations were utilised, in order to estimate the rate of progress of the lung changes. Of 2631 persons from various industries examined, 408 showed stage 1 of silicosis, 141 stage 2, and 76 stage 3. As would be expected, the hazard varies very much with the type of work. Thus stage 3 was first reached in under 5 years in quartz milling, after 10–15 years in cleaning castings (fettling), after 15–20 years in furnace repairing (iron and steel) and drilling iron ore, after 25–30 years in porcelain works, and after 35–40 years in foundry casting. After 20–25 years of work all the sandstone grinders, 60–70% of the porcelain workers, furnace repairers, fettlers and drillers in iron ore, but only 2% of the foundry casters had silicosis of one stage or another. The repeat survey led to the impression that, if it takes a long time to reach stage 1, there is in general little tendency towards further change, even if dusty work is continued; whereas if stage 1 is reached quickly further lung changes may occur even if the dust exposure ceases. Drilling iron ore seems to be an exception, for drillers contracted stage 1 comparatively rapidly but there was little progress towards further change; this may be due to the quartz in the dusts being diluted with much iron oxide. The X-ray appearances showed differences for the different occupational groups. Thus linear exaggerations (reticulation ?) are well-marked in porcelain workers but absent in iron-ore drillers, whereas foundry casters and furnace repairers take an intermediate position. With porcelain and silicon-alloy workers, and in quartz milling, the nodules have irregular shapes and diffuse boundaries and are not very dense. With the other occupations examined, particularly in iron-ore drillers, the nodules are round, more clearly defined and denser. In advanced silicosis lateral X rays show the boundary between consolidated and emphysematous parts of the lungs to have a different position for different types of occupa[illegible] shows dislocations and [illegible] Routine clinical tests [illegible] increased from stage 1 to stage 3. No tendency to adiposity but a slight reduction in thorax mobility was seen in stage 3. The clinical observations, apart from the X rays, were chiefly concerned with objective

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1. Bruce, T. *Acta med. scand.* 1942, Suppl. 129.

measurements of the impairment of lung function during rest and work. For analysis of these clinical tests the three silicotic stages were subdivided into (*a*) those without subjective symptoms, (*b*) those with dyspnœa and partial disability, and (*c*) those with total disability. Extensive spirometric measurements during rest showed no significant differences for minute-ventilation or oxygen-ventilation equivalent, but stage 3, and particularly group 3*c*, showed a higher respiration frequency and reduced total capacity, due to a reduction of the complementary air, not of the functional residual air. Spontaneous hyperventilation led in many stage 3 cases to a rise of expiration level. When spirometric measurements were carried out during work (stair-climbing), respiratory insufficiency was only found during the heaviest type of work with stage 1; it increased with stage 2 and was very frequent even with the lightest type of work with stage 3. Other affections of the cardiopulmonary system in combination with silicosis usually caused greater insufficiency. Bruce's survey gives a good picture of the level and variation of hazard found in Sweden, while the clinical part of his book brings out the relation between lung function and anatomical change of the lungs. But he does not contribute to our knowledge of how and why the dust causes the lung changes.

THE UNSUITABLE SOLDIER

EVERYBODY agrees that men of neurotic disposition who are very likely to break down in the Services should be spotted and rejected at the outset. Few people however have the hardihood to say that we have any sure means of detecting nearly all such people at the outset, if they have not already had, or still exhibit, a neurotic illness. There is a big gap between contending that manifestly predisposed and unsuitable men should have been recognised as such, and asserting that all those who have subsequently broken down once were manifestly predisposed and unsuitable. The gap has been made narrower by the intelligent use of wisdom after the event, as in studies of the abnormal traits of personality which are discovered to have been commonly present in the men who subsequently broke down. Steinberg and Wittman[1] point out that such studies are of doubtful value until we know the frequency with which the same traits occur in people who do not break down. For this reason they examined three groups of soldiers—158 presumably healthy men attached to the Army Medical Corps, 22 soldiers in the psychiatric unit of a general hospital, and 87 patients in the Veterans unit at a mental hospital. The men in the second group were suffering almost entirely from neurotic illnesses, and those at the mental hospital had been, or were still, insane. The investigation was a thorough one, covering the customary material of a psychiatric history as well as special psychological tests aimed at the elucidation of the patient's personality. The Guilford personality scale was employed, and personality was accordingly assessed in terms of the five factors—social introversion, thinking introversion, depression, cycloid tendencies, and care-free disposition and impulsiveness. The control group differed strikingly from the other two. Whereas half the neurotics and psychotics were socially introverted and depressive or cyclothymic, among the controls one-third or less showed such features, and 84% of them were care-free and lively—a characteristic found only in about a quarter of the men with psychiatric illness. It was also found that the relationship of the men to their parents, especially to their mother, had been far more satisfactory among the control group, and that a history of social and sexual maladjustment in early home and school life [illegible] en prominent in the psychotic soldiers, though not in the neurotic or healthy ones. There was a striking difference in the average number of jobs and in the longest time any single job had been held; the maladjusted men had on the average held two or three times as many positions as the control group, and there was a similar proportion in the duration of individual jobs. Teetotallers were more numerous among the maladjusted; so were divorced persons.

It would not be prudent to accept these findings as they stand, though the method is a proper one. The numbers chosen, particularly in the neurotic group, are far too small for it to be certain that the sample is representative; in support of this objection is the fact that 20% of the neurotic subjects, and 38% of those in the mental hospital are reported to have shown homosexual traits—a remarkably high proportion. It would be necessary to know how the men were selected, how far the history of their past lives was obtained from reliable sources, and whether the men of the Medical Corps unit in question differed in any material respect from the average run of men in other branches of the Service. It is also open to question whether a healthy man takes as much trouble in giving full replies to a questionnaire about his personality and history, especially in its more shadowed aspects, as a patient with a psychiatric illness. Nevertheless, further investigations of this sort on a larger material would be welcome, and the recommendations put forward by Steinberg and Wittman deserve attention. They point out that any one specific factor or symptom is of limited importance since it may occur also in well-adjusted persons, but that the intensity and number of such factors, recorded as a numerical value or score, provides a useful indicator which might well be used as a routine measurement of predisposition. A rating form satisfactorily standardised and so arranged as to indicate how the man had reacted to army life can be filled out by the immediate superior officer or medical officer of the man's unit and is very helpful to the psychiatrist to whom he may be referred.

REGENERATION OF NERVE

KNOWLEDGE of the rate of nerve regeneration is useful for determining the time at which recovery may be expected after nerve suture, and still more important in cases where nerves have been injured but not sutured. Absence of exact information about the time at which spontaneous recovery may be expected probably leads to undue delay before exploratory operation in many of these cases. The rate which is required is of course not that of the advance of the tips of the new fibres. Thin nerve-fibres may reach a muscle long before it shows recovery. Before the new stretch of nerve can function the nerve-fibres must thicken and medullate. By studying the time at which function returns in muscles at various distances from the lesion we can therefore estimate the rate of advance of what may be called functional completion[1] along the nerve. Seddon, Medawar and Smith[2] have made a careful study in this way of the rate of recovery in 25 cases, mostly in the radial nerve. The distance from the lesion (or suture) to the various muscles was estimated from a series of dissections. Recovery was found to take place in a regular serial manner, but plots of the distance of each muscle from the lesion against the time of recovery often do not give straight lines, suggesting that regeneration is fast at first and becomes slower for the more distal muscles. There is, therefore, no constant "rate of regeneration." The data are not sufficient to allow the shape of the curve describing the decline to be discovered accurately, but Seddon and his colleagues suggest that it may be a *hyperbola, the rate being inversely proportional to the* square of the time, beginning as high as 3 mm. a day, and falling to about 1 mm. a day at 100 days or so after recovery has started. This would agree with the findings of Gutmann and others[3] that regeneration to the level of functional completion may proceed down the short nerves of rabbits as fast as 3·5 mm. a day. Until more is known of the course of decline in the rate of recovery average values can be used for comparing the results after different types of lesion. The rate per day in the radial nerve after suture was found to be 1·6 mm. as the average of 6 cases, with variations between 1·0 and 2·4 mm. In 10 cases of "spontaneous" recovery (axonotmesis) the average rate was 1·5 and the limits 0·7 and 2·1 mm. per day. The rate of recovery in 14 cases of suture of radial nerve described by Stopford[4] can be calculated in the same way, and proves to be only 0·6 with extremes of 0·4 and 0·7 mm. per day. The reason for the strikingly faster rate in the recent cases remains obscure. The possibility of making such comparisons shows the value of the method. It is to be hoped that with the careful following of cases now being undertaken at the various nerve injury centres still more exact estimates and further information about the variables which affect the rate of nervous regeneration will be obtained. This should help considerably in the diagnosis, prognosis and management of these cases in which the long delay before recovery is such a difficult feature.

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[1] [illegible], D. L. and Wittman, M. P. War Medicine, August, p. 129.

[1] Young, J. Z. *Physiol. Rev.* 1942, 22, 318.
[2] Seddon, H. J., Medawar, P. B. and Smith, H. *J. Physiol.* 1943, 102, 191.

FEEDING THE EAST AFRICAN FORCE

THE Africans serving in the campaign which restored Abyssinia to the Abyssinians were drawn from nearly 200 tribes. In a single round at the large base hospital for African soldiers at Nairobi it was possible to see men from Nigeria, the Gold Coast and other colonies on the West Coast, black and coloured men from all parts of South Africa, and tribesmen from the Rhodesias, Nyasaland, Kenya, Uganda and Tanganyika; Somalis and occasionally Abyssinians. Most of these people had their own dietetic preferences and different methods of preparing their food, and the difficulties of catering for such a heterogeneous collection of people seemed almost insuperable in hospital. On active service conditions were naturally different, and every race, with the sole exception of the Somalis, accepted the common Army ration. This remarkable breakdown of the innate conservatism of the African in the matter of food—a conservatism which is held to be responsible for much of the malnutrition in Africa—should, as Farnworth Anderson[5] points out, have a considerable influence when these thousands of men return home. A former director of Army Medical Services in East Africa reported that the low incidence of disease in the troops was largely due to the fact that the supply of food had been on the whole well maintained. During the first year the deaths from sickness in the African troops stood at the remarkably low rate of 3·4 per 1000 per annum. Anderson records that [illegible]

and fruit were overcome to some extent by the issue of ascorbic acid tablets imported from home. These were later replaced by sweet capsicum or paprika, sprouted pulses and native beer, and by dehydrated vegetables produced at Keruguya in Kenya. Large quantities of these dehydrated vegetables were later sent to the Middle East. Patients with vitamin-A deficiency were given ghee and red palm oil. Calcium was supplied where required by the addition of bone-meal or precipitated chalk to the cereals. A local outbreak of beri-beri from unpolished rice used by the Somali was rapidly controlled by the issue of a millet sorghum. While giving due credit to Brigadier Orenstein and his colleagues in the medical department for these satisfactory results, high praise must also go to the supply and transport services, working over lines of communication often 2000 miles long, and using roads which in many parts were almost impassable.

CHEST TROUBLES AFTER HERNIA OPERATIONS

THE chief bugbear of the anæsthetist is still post-anæsthetic trouble in the respiratory tract. The development of such trouble is probably determined much more by the site of the operation than by the anæsthetic agents or lack of skill in their employment. At the Royal Society of Medicine on Nov. 5, Squadron-Leader B. G. B. Lucas gave figures showing the prevalence of chest complications after operations for hernia on men in the RAF. Every operation which damages the abdominal wall is liable to be followed by such complications, because the pain caused at the site of the wound by a cough induces the patient to avoid coughing and deep breathing. The diaphragm, too, is often inhibited on the damaged side. Secretions collecting in the air-passages are thus not dislodged. The ensuing complications may take the form of lobular atelectasis, sometimes of lobar atelectasis—which is of greater import—and sometimes of frank bronchitis. Many of the patients simply had coughs after operation with no physical signs or rise of temperature. In most patients trouble was slight and over in a few days, but in the worst series 14% of the patients had severe trouble. A great variety of anæsthetic methods were tried in order to see whether the anæsthetic could be incriminated. The number of patients with subsequent chest trouble remained about the same, whether regional analgesia with or without chloral, 'Pentothal' alone or pentothal with gas and oxygen, or gas and oxygen and ether was employed. It is noteworthy that a large number of patients had a cough before operation, generally attributable to smoking. One speaker at the meeting brought forward evidence that smokers suffered much more often than non-smokers from respiratory trouble after operation. The most effective treatment, according to a consensus of opinion at the meeting, is to be found in breathing exercises begun before operation and carried out systematically for some days afterwards. Being mechanical in origin the condition can be prevented mechanically.

THE COPLEY MEDALLIST

THERE is a paradox about the first breath as there is about the maiden voyage of a steamship. Behind the initiation of the vessel's functional life is a background of trial trips, assemblage of parts, fitting of machinery and all that. Sir JOSEPH BARCROFT has shown that the movements responsible for the first breath have a history that can be traced back to the very first efforts of which the fœtus was capable. The captain and the accoucheur have been too deeply engrossed in the safety of their precious charge to observe and experiment. The Copley medal has been won by the physiologist who has within a period of five years filled an age-long gap in our knowledge of the act of birth. The achievement was not simply a flash of insight but the sequel of life-long inquiry—here, there and everywhere—into the mechanics of respiration, and conveyed with the inimitable descriptive faculty of one fortunate to draw his own first breath in co. Down.

". . . When a man is taken to a certain hospital in the [illegible] have [illegible] al."—

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3. [illegible] Medawar, P. B. and Young, J. Z. [illegible]
4. [illegible] 43, 1.
5. [illegible] 1943, 20, 297.

Special Articles

THE PHYSIOLOGICAL ANATOMY OF HEALTH CENTRES

So far, relatively little thought has been given to the design of health centres. In hospital planning structure must of course be determined by function, and the same must apply to other buildings used for health purposes. The external and internal architectural treatment are likely to have some psychological significance both for the public who will have to adapt themselves to the new conception of group practice, and for the staff of the centre, whose work must to some extent be modified by the milieu in which it is done.

A number of examples of health centres to house municipal health services already exist. Bristol has been a pioneer in this respect; in the last seven years, one main and four branch centres have been built; their weekly attendance is about 10,000, and the main centre is already too small. Two of the centres at least provide radiological facilities available to the general practitioners of the city. The Finsbury borough health centre is small but attractive; an original and popular feature is a clinic for foot ailments. Another small municipal centre is that of Darwen, opened in November, 1942. This centre is situated within easy access of any part of the borough, and the premises are well built and suitable for clinical work; but experience has already shown one or two slight defects which may serve as a warning to other designers. Public health and sanitary services, child welfare, antenatal and postnatal clinics, school medical services and such subsidiary services as orthopædic and school dental clinics, speech therapy, child guidance and diphtheria immunisation are all housed in or operated from the centre. Since it was established the public have made fuller use of the health services. Proposals for a series of main and subsidiary centres in Manchester were described in a recent issue,[1] and an impression of one of these main centres may now be added (fig. 1).

These municipal centres give only limited guidance when proposals for general practitioner health centres are considered. An attempt to meet this specific need has been provided by the Medical Practitioners Union.[2] It was disappointing to see the factory-like elevation of their proposed building, and the rows of seats in the diminutive waiting-rooms reminiscent of the poorer type of lock-up surgery. Moreover there is a danger that if it is left alone in the field this type of centre might be adopted in principle by the Ministry of Health, and model plans based on inadequate proposals might be issued to local authorities. Much more stimulating are the designs of Lionel Pearson, FRIBA. A careful study of Mr. Pearson's plan (figs. 2 and 3) shows that function has determined structure at every stage; and the result is a building of real charm.

CHOOSING THE SITE

The needs are: adequate lines of communication for the patients and staff; reasonable quiet; and adequate space.

The patients attending a health centre are going to be drawn from an area considerably more extensive than that covered by the average doctor's surgery. Having decided the area—the margin of which cannot be absolutely precise since choice of doctor, and hence of centre, is to be at the patient's discretion—it will be necessary to study carefully a map showing:—

1. Density of population, and location of dwellings.
2. Public transport services (frequency of running should be known).
3. Natural foci of community life such as shopping centres, cinemas, schools, public libraries, and municipal offices.

Sites having suggested themselves, possibly adjacent to or behind shopping centres, it will then be useful to check how long it will take residents at a dozen places on the periphery of the area to reach each site. Sites should be near, but set well back from, main roads. [illegible] officers of health might do well to select a few possible sites in advance, and discuss them with the town planning officers of their authorities, particularly where air-raids have done substantial damage.

EXTERNAL NEEDS

There must be a covered parking place for prams, push-chairs, bicycles and invalid chairs, immediately adjacent to the main entrance. Since most of the medical staff will probably come and go by car, there should be a covered parking place for the doctors' cars, wide enough to allow any car to leave without displacing the others. It is anticipated that at least one assistant doctor will be resident at the centre, and he may be called out to visit patients in their homes; further, it may be convenient for the doctor on night duty to leave his car at the centre; so at least two lock-up garages should be provided. Patients may have to be removed by ambulance, and it will avoid gaping sight-seers if a back approach for ambulances and lorries is provided.

An open-air playground will be needed—particularly where children's clinics are held. A part of this might be roofed in as in Mr. Pearson's plan. Finally a garden for the resident and other staff would be welcome.

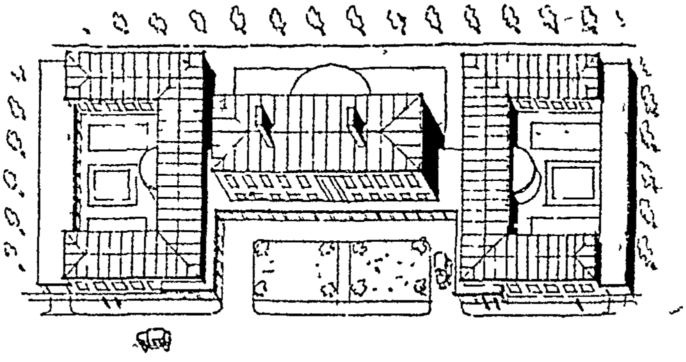

Fig. 2—Design for a family health centre by Lionel Pearson, FRIBA.

INTERNAL NEEDS

Since the essence of the centre is preservation of the doctor-patient relationship the main entrance should be the entrance for everyone. The day when patients were passed round the side, like tradesmen, must surely be over.

Mr. Pearson has divided his centre into three sections: a central one with the common services, a left-hand section containing the general-practice department, and a right-hand section for clinics and dentistry. In principle this seems a sound arrangement.

On entering, the patient's first port of call must be the registry. Here he would be issued with a card giving an appointment number, and the clerk would immediately send his records through to the doctor's consulting-room. The circulation in Mr. Pearson's plan might be eased by reversing the position of the clerical registry and the X-ray room. The registry should include not only a record room, an appointments register, and a typing pool, but also a room for one or more social workers.

The patient, with card, will now go to the main waiting-room. This should be reasonably large, comfortably furnished, and cheerfully decorated. It should have a lavatory for each sex adjacent. Each doctor would signal for his next patient by pressing a numbered button on his desk, when a soft buzzer would sound in the waiting-room and the number on the patient's card would be illuminated beneath the doctor's name.

It is assumed that doctors will collect and examine specimens in their consulting-rooms. The microscopic examination of urine in particular should certainly not be delegated to anyone else. Blood for tests will also be taken in consulting-rooms, though blood-counts and other investigation will be done in a common laboratory. Each consulting-room should have a weighing machine, an X-ray viewing screen, a built-in sphygmomanometer over the couch, and a good blind for darkening the room for ophthalmoscopic examinations. In the patient's note-file will be a treatment and certificate card, on which the doctor will write his prescription, adding his initials in columns marked for the appropriate certificates—a process taking perhaps 30 seconds. The patient, having been instructed about when to report again, will then leave with his treatment card and go to the dispensary. While medicine is being prepared, he will sit in the waiting-room, and when it is ready he will take the treatment card to the social worker who will issue him with the appropriate certificates, stamping them with [illegible] oints [illegible] take [illegible] ment card, which will then be returned to the record department. All the patients' notes will be collected at the end of the session. All rooms should be linked by an internal automatic telephone, so that, for example, any doctor who wishes to call in a colleague to see an interesting or difficult case may easily do so.

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[1] [illegible], 1943, ii, 490.

[2] *Ibid*., 1943, ii, 365.

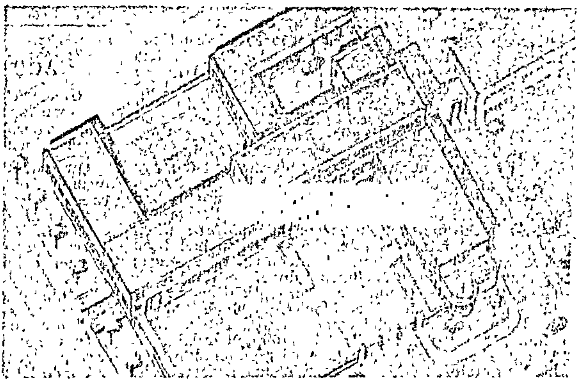


Fig. 1—Design for a municipal health centre by G. Noel Hill, FRIBA, MTPI, taken from a report on health centres presented to the Manchester Public Health Committee on Sept. 16, 1943, by the Medical Officer of Health.

In addition to a small clinical laboratory, the general-practice section should *contain two surgeries—one for clean cases* and plaster work, and one for infected cases—with a surgical waiting-room (equipped with simple resuscitation apparatus for accidents), a common anæsthetising room, and two recovery rooms.

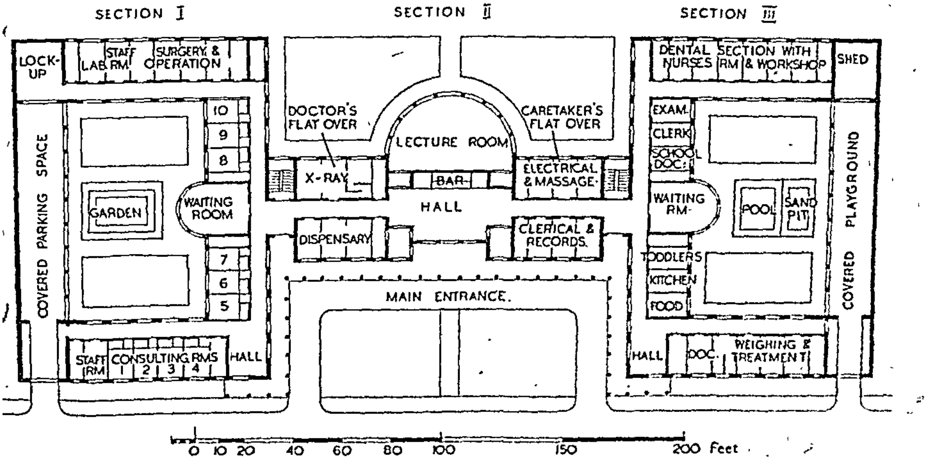
The section for clinics and dentistry might again well centre round a large waiting-room—or better two waiting-rooms, since those with toothache are hardly likely to [illegible]

wo—should open out of nurses rooms where babies n be weighed and mothers prepared for examination. here should be rooms for the treatment of dirty hildren and minor ailments; and one or two rooms here domiciliary midwives can keep their records, and ore and sterilise their instruments. The dental ection might include a special extraction room, a echanic's room, and a dental nurses room, in addition o the dentists consulting-rooms.

In the central block, Mr. Pearson includes a large ecture room, an X-ray department, and an electrotheraeutic and massage department. It is suggested that he central block should have three floors. The first hould be devoted to common staff-rooms, while the top floor should provide two flats for the assistant general practitioners, and a third flat for a resident caretaker. On the first floor there should be a common canteen for all the staff—doctors, dentists, nurses, social workers, clerks, and technicians—on the cafeteria system, with the necessary kitchen and scullery. There should also be a small committee room, a large common smoking-sitting room, and a library—though this might be combined with the committee room.

THE COUNTRY DOCTOR

In rural areas, the ideal plan would be to combine the necessary facilities for health work in each village with other social service needs, to produce a village community centre. The district nurse's room, the doctor's surgery—visited, say, twice a week for general clinics and once a week for maternity and child welfare clinics—and a small dispensary, might open out of a waiting-room which on other occasions became the village hall. In addition, under the same roof there might be a British Restaurant and school canteen, the village library, a young people's club-room, and a committee-room.



Ig. 3—Layout plan of the centre shown in fig. 2. Section I: General practitioners' consulting-rooms with coöperating medical services. Sect and special departments. Section III: maternity and child welfare, school and dental clinics Figs. 2 and 3 appeared in Architectural 1943, 13, 61, and are reproduced by kind permission of the Editors and Mr. Pearson

MEDICINE AND THE LAW

Irregularities disclosed at Inquest

At a recent inquest held by the coroner for West Kent witnesses spoke of two irregularities. The first was that a hospital medical officer had issued a death certificate stating that the cause of death had been confirmed by a post-mortem examination whereas no such examination had yet been made. Answering the coroner, he excused himself by pleading that the relatives wanted a certificate at once. The second irregularity was that, when the pathologist arrived at the mortuary for the post-mortem examination, he found the skull already opened up. There was no direct evidence to explain how this had happened. The mortuary technician told the coroner that he left the mortuary unlocked at 9.55 AM; when he returned 20 minutes later, the skull cap had been removed. He could throw no light on the occurrence; the removal, he said, was clumsily done.

The death which the coroner was investigating was the result of an operational accident for which nobody blamed the surgeon. A woman entered the hospital to undergo an operation for trigeminal neuralgia. A local anæsthetic was used. The surgeon employed a lighted retractor. When he was about to sever the nerve, a nurse who had patted the patient's hand to reassure her, reported that she felt an electric shock; feeling faint, she was told to switch off the current and leave the theatre till she recovered. The surgeon could hardly pause to ascertain the source of the nurse's shock; the fact that the retractor bulb had not burned out seemed to negative the passage of abnormal current down the machine. Suddenly the patient went into an epileptic fit; hæmorrhage began and had to be arrested; the operation was not completed; the patient was taken back to the ward where she died. There was evidence at the inquest of previous complaints of the electric transformer, surgeons having received minor shocks. The apparatus had been sent away to be overhauled; the trouble on this occasion, according to an electrical engineer, was a short circuit.

The jury, while absolving the surgeon from all blame, criticised the unsatisfactory service of the electrical apparatus, the issue of a false death certificate, and the lack of supervision at the mortuary. The coroner commented on the delay in notifying a death at a hospital when an inquest seemed necessary. Bereaved relatives, he observed, were sometimes told at a hospital that no inquest or post-mortem examination would take place; the authority of the coroner was thereby usurped. The result was that relatives made arrangements with undertakers for the funeral and then were greatly distressed if the coroner had to intervene. He suggested that he should be notified within 12 hours of the death of a mental patient and within 24 hours of other deaths which required investigation. If this were done, the family's distress to which he had referred would be avoided.

Infectious Disease in England and Wales

WEEK ENDED OCT. 30

Notifications.—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 3623; whooping-cough, 1693; diphtheria, 702; paratyphoid, 5; typhoid, 7; measles (excluding rubella), 585; pneumonia (primary or influenzal) 576; puerperal pyrexia, 196; cerebrospinal fever, 26; poliomyelitis, 13; polio-encephalitis, 1; encephalitis lethargica, 0; dysentery, 248; ophthalmia neonatorum, 75. No case of cholera, plague or typhus fever was notified during the week.

The number of civilian and service sick in the Infectious Hospitals of the London County Council on Oct. 20 was 1978. During the previous week the following cases were admitted: scarlet fever, 206; diphtheria, 53; measles, 11; whooping-cough, 44.

Deaths.—In 126 great towns there were 2 (0) deaths from enteric fevers, 2 (1) from measles, 1 (1) from scarlet fever, 3 (2) from whooping-cough, 21 (1) from diphtheria, 55 (4) from diarrhœa and enteritis under two years, and 25 (4) from influenza. The figures in parentheses are those for London itself.

Wakefield and Cambridge each reported 1 fatal case of enteric fever. Birmingham had 6 deaths from influenza. There were 8 fatal cases of diarrhœa at Liverpool.

The number of stillbirths notified during the week was [illegible] onding to a rate of 34 per thousand total [illegible] ncluding 20 in London.

Public Health

OUTBREAK OF ACUTE ARSENICAL POISONING

G. MATTHEW FYFE
M B ABERD, D P H
MEDICAL OFFICER OF HEALTH FOR FIFE COUNTY

B. W. ANDERSON
M D ST. AND, D P H
DEPUTY MEDICAL OFFICER OF HEALTH FOR FIFE COUNTY

On Jan. 15 and 16, 1943, in St. Andrews, there was an outbreak of acute arsenical poisoning following on the consumption of sausages and resulting in at least 150 cases of illness and 2 deaths.

The sausages were made in a butcher's shop in three batches during the forenoon of Jan. 15. The ingredients of each batch were: 10 lb. meat and fat, 15 lb. biscuit meal, ¼ gill sulphur dioxide preservative, 1 lb. pork seasoning and 10–12 pints water. The duty of preparing the sausages was shared between 3 assistants. The meat was minced and subsequently mixed with the other ingredients in a large galvanised iron bath. The mixture was passed through the mincer and more than half was afterwards fed into a sausage-making machine, the remainder being retained for sale as sausage meat. None of the workers in the shop would admit to any departure from this procedure, addition of another ingredient or to the possibility of interference by another person.

COURSE OF ILLNESS

The three batches were sold as sausage meat and as sausages to the general public and to a students' hostel. Symptoms followed rapidly after consumption. The first cases occurred in the students' hostel where sausages from the third batch were eaten at lunch. Approximately 90 men were affected. The illness was fairly severe while it lasted but only one man sought medical attention. Later in the same day and on the following day cases of acute illness occurred throughout the town and subsequent investigation showed that only those who had eaten this foodstuff were affected. Those who partook of the first batch manufactured reacted more severely than those who ate from the second and third batches. Medical advice was sought in many cases and the attention of the public health department was directed to the occurrence on the afternoon of Jan. 16.

Most of the patients experienced epigastric discomfort within a few minutes of eating the food and most cases vomited violently 5–15 minutes later. Some patients felt discomfort before they had finished eating their portion and left the remainder uneaten. No one noted anything unusual about the taste of the sausages. Dogs which were given discarded portions consumed them and were sick. Cats declined to eat them but this may have been due to the pepper which formed part of the seasoning.

In some cases the vomiting continued for more than 8 hours. Diarrhœa developed in most cases some 3–6 hours after the onset of vomiting, but its severity was much less than that of the vomiting; some cases had no diarrhœa. Patients were left in a state of exhaustion or collapse, all of them suffering from varying degrees of dehydration. The period of illness lasted in mild cases for 3–4 days, in severe cases up to 6 weeks.

CASE 1.—A man, aged 52, consumed for breakfast on Jan. 16 4 sausages containing, it was subsequently found, a total of gr. 45 of white arsenic. He experienced immediate abdominal discomfort and pain but did not vomit until two hours later. Vomiting was then severe and later was accompanied by diarrhœa. He became collapsed and dehydrated, and although towards evening his condition improved, he relapsed and died in the early hours of Jan. 17, some 17 hours after eating the sausages. He was obese and not in the best physical condition.

CASE 2.—A woman, aged 48, ate for breakfast on Jan. 17 3 sausages purchased from the same batch. Half an hour later she began to vomit and continued to do so for 6 hours, for the latter half of which period she also had diarrhœa. She became extremely collapsed and showed much evidence of dehydration. She died 12 hours after ingestion.

The main findings on post-mortem examination were identical. The stomach was congested, greatly distended with gas and contained fluid The congestion and distension continued throughout the length of the duodenum and gradually lessened in the course of the jejunum The ileum was not distended but was slightly hyperæmic In the male the large intestine was normal in size and in appearance, in the female it was contracted and pale The mucous membrane of the stomach duodenum and jejunum showed acute inflammatory changes The only other abnormalities found were of long standing In the female there were extensive old pleural adhesions and in the male fatty infiltration of the liver, a heavy deposit of fatty tissue on the heart wall and one or two small nodules and points of thickening on the aortic valve

INVESTIGATION

Although symptoms pointed more to an irritant poison as the cause of the outbreak, specimens of sausage meat, of stomach and bowel contents, and of abdominal organs were submitted as a routine for bacteriological examination The bacteriologist s report showed that while a few staphylococci were present in the sausage meat they were insufficient in number to account for the development of an enterotoxin Cultural examination failed to display in any specimen the presence of any micro-organisms of the salmonella or dysentery groups

On specimens of sausages and sausage meat sent for chemical examination the analyst reported as follows

First batch —Three samples of sausages analysed contained 98, 99 4 and 102 4 grains of white arsenic per lb (The first and third of these samples were part of the lots actually eaten by the 2 persons who died)

Second batch —The sausage meat contained gr 0 54 per lb

Third batch —The sausages contained gr 4 16 per lb

The arsenic was present in each sample in the form of arsenious oxide (As_2O_3) and the relative quantities indicated that the arsenic was added to the first batch only and that successive batches were affected by the residues carried over from one making to the next A sample collected from a fourth batch manufactured on the morning of Jan 16 contained only gr 7/125 arsenic per lb Only one family made purchase from this batch and consumed the meat with no adverse effect

Assuming this method of introduction to be correct, since the weight of a batch of sausage meat was between 35 and 40 lb approximately one half pound of pure white arsenic had been added to the first batch of sausage meat The first batch was sold to the general public and, as has been stated, the cases of illness so produced were much more severe than those in the students' hostel to which parts of the second and third batches had been sent, or among 3 of the shop employees who also partook of the later batches

Arsenious oxide was found present in the stomach and bowel contents and in the abdominal viscera of the 2 fatal cases in quantities sufficient to cause death

Chemical analysis was made of all the materials used in the making of the sausages—seasoning, preservative, biscuit meal, salt and skins, and also of the contents of all packages, tins, bottles, bags, &c , found in the shop No trace of arsenic was found in any Examination of dust from the pockets of the workers gave negative results The butcher-meat from which the sausage meat was made was cut from a large portion of a carcase which was otherwise consumed by the public without injurious effect

On April 27—101 days after consumption of sausage meat—specimens of urine, fæces and hair were obtained from 2 men who had been ill These were sent for analysis The specimens of fæces contained 0 2 and 0 5 parts As_2O_3 per million respectively while the urine contained 0 05 and 0 15 parts per million No arsenic was present in the hair Neither of the two men had in the interval been taking any preparation containing arsenic

After it had been established that the cause of the outbreak was not of bacterial origin, investigation was continued by the police but no evidence was found as to how the arsenic was added to the sausage meat, or as to its source All local purchases of arsenic from chemist shops and other premises were checked Sales by wholesalers over a wide area were investigated Stocks in local laboratories were found to be intact It is to be presumed, therefore, that the white arsenic used was purchased some considerable time ago by some person unknown

DISCUSSION

The fact that the arsenic was present as pure arsenious oxide probably excludes purchase from sellers of poisons listed in part II of the poisons list (Poisons List Confirmation Order, 1935) If the arsenic was purchased, it is more likely to have been bought from a retail or wholesale chemist or obtained from a manufacturing firm The poisons rules are so framed that a private person can purchase white arsenic only if

(*a*) he is known to the seller as a person to whom this poison may properly be sold or is certified in writing by a responsible person known to the seller to be a person to whom the poison may properly be sold and

(*b*) he signs the poisons register and indicates the purpose for which the poison is to be used

An improper sale under such conditions can hardly be envisaged in these days Further the sale of certain arsenical compounds (and these include the oxides) is prohibited if these are intended for use in agriculture or horticulture, for the destruction of bacteria fungi insects, vermin or weeds, unless there has been added a dye of distinctive colour and soluble in water (Poisons Colouring Rule, 1936) These provisions restrict the sale of white arsenic, but a great responsibility rests on the seller since he has to be satisfied not only as to the person receiving the arsenic but as to the purpose for which it is to be used

Although none of the chemists shops visited held [illegible]

[illegible] in lots from a retail chemist and it was not coloured

Again, while the rules concerning the retail sale of arsenic are reasonably strict, they do not apply to wholesale dealings or to the sale by wholesalers or manufacturers to persons who regularly use arsenic in the manufacture of other articles If white arsenic be required for the purpose of a trade, business or profession, an order has to be signed specifying inter alia the purpose for which the arsenic is required, and here again the seller has to be "reasonably satisfied" as to the propriety of the proposed purchase

There is, therefore, an unexpected number of persons who can purchase, or who have access to, white arsenic Furthermore, while the rules governing storage apply to types of containers, transport and storage in retail shops and institutions, they do not apply to storage after purchase so that there is always the possibility of arsenic getting into the hands of unauthorised persons As an example, one might instance the ease with which arsenic could be removed from a laboratory If it is not practicable to stre [illegible]
all buyers sh [illegible]
be used only [illegible]
and they sh [illegible]
there is no [illegible]

[illegible] which rests with persons selling arsenical compounds to see that they get into the hands only of persons who have a proper use for them

SUMMARY

An outbreak of acute arsenical poisoning due to consumption of contaminated sausage meat is described, involving at least 150 cases of illness and 2 deaths

Arsenious oxide in pure form was recovered from the sausage meat in amounts ranging from gr 7/125 to gr 102 4 per lb

The source of the arsenic was not traced

Traces of arsenic were still present in the fæces and urine of patients 101 days after consumption

It is suggested that steps be taken to provide further safeguards in the sale and storage of arsenic

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ROYAL MEDICO-PSYCHOLOGICAL ASSOCIATION —At 10 30 A.M on Wednesday, Nov 24 at 1, Wimpole Street W.1, there is to be a discussion on postwar psychiatry, continued at 2 P.M.

In England Now

A Running Commentary by Peripatetic Correspondents

SOME enterprising publisher might do much good, though he wouldn't make much money, by producing a hospital phrase-book. In our medical ward at the moment is a wretched Italian prisoner with some obscure kind of jaundice which makes him feel very ill and needs a lot of investigating. He can speak no English and none of the medical or nursing staff has a word of Italian. The difficulties involved in his treatment, and particularly in his nursing, can well be imagined. There must be many foreigners with no more than a rudimentary knowledge of English in British hospitals here and abroad just now, and our responsibilities in this direction are likely to get steadily heavier. What is needed is either a single phrase-book covering the likely languages—French, German, Italian, and perhaps some central European and Scandinavian tongues—or a series of phrase-books covering one language each. The phrases would include the essential questions which the doctor or nurse may want to ask, and the explanations of treatment or routine they may have to make; and, from the patient's point of view, symptoms, likely requests and so on. A committee including an experienced ward sister or two could without much trouble draw up a list of phrases which would be an immense help though it could not cover every eventuality.

* * *

Dear opponents-of-nursery-schools, have you ever watched a mother entertaining her little one on board a Clyde steamer? This is how it goes:—

"Maw, what kind o' a ship is this?"
"Sit doon an' haud yer wheesht." (pause)
"Maw," as he points to the lovely range of Arran peaks, "what hills is these?"
"A dinna ken; sit still." (interval)
"Maw, what's a submarine like?"
"Here's a sweetie, an' shut up." (long pause)
"O maw, come an' see this big ship."
"Come aff they railings or I'll skelp yer backside."

This apparent severity is not really vicious; it is simply due to lack of training. Many of these mothers have no stories to tell to children and are devoid of any means of interesting them. In consequence they divide their time between useless scolding and an equally senseless coddling. The child of this type is generally master of the household and he knows it. His whims determine the food that is eaten and rejected and the whole family revolves round him. The serious question is, how do these half-pampered, half-bullied children look when they are grown up?

I can't pretend to give a studied answer; but my friend M was in a crowded train near Stirling the other day when two women holding babies had to stand beside him in the compartment while a boy of sixteen or so sprawled across a corner seat in luxurious ease, smoking a cigarette and reading a book entitled *The Boy Racketeer*. Perhaps the clue lies there. The girls are much the same: in my hospital we often get probationers who on their own confession have never made a bed or a semolina pudding. "O, mother always did that!" Then I am moved to think of Weir of Hermiston, who knew something of the world: "Gie me a lassie that can plain boil a potato, and I don't care if she be a whure off the streets."

* * *

This morning one of my patients knocked the conceit out of me in no uncertain manner. He was an elderly man from whom I had removed a gangrenous appendix four days previously, and he had made an uneventful recovery. "I've made a wonderful recovery, haven't I, doctor?" was his sighting shot, to which I readily agreed. Then, "In fact I've recovered far more rapidly than you at first anticipated." It was obviously up to me to fall in with this perfectly true suggestion but his face lit up as he saw my guard lowered and my chin exposed for his knockout. "I can now let you into my little secret. As soon as my doctor told me that I had to have an operation and that you were coming to I realised that my condition was pretty desperate. immediately a cable to an old friend, a faith now in Hobart, Tasmania, telling him of my plight. He replied at once 'I am treating you. Don't worry.' Surely your admission that I got on more quickly than you expected proves that my friend's treatment has been successful." I did my best by murmuring humbly, "All the same I did remove your appendix." *Quick as lightning he came back at me*, "Yes, but my friend was there in spirit to aid your decisions and to guide your hand." What more was there to say? I took the count.

* * *

One of your correspondent's notes about illegible prescriptions started a conversation about some other vagaries of prescribers. One of the circle told us he made a hobby of collecting unusual and curious prescriptions and he had just acquired a new specimen. It read:

℞ Antim. pot. tart. BP ..	·0083% w/v
Ammon. acet. ..	1·8%
Tinct. opii BP ..	·234% v/v
Acid benzoic.	·0234%
Camphor	·0140%
Ol. anisi	·0140%
Ethyl nitrite	·12%
Spt. vini rect. ..	3·78%
Glycerin	3·125%
Trichloromethane ..	·125%
Tinct. senegæ	1·561%
Aqua ad.	100%

Mitte 20 oz.

"Were I a pharmacist faced with this," he said, "I would feel like beating my head against the wall. And if it appeared as a NHI script for which I was to receive 5*d.* as dispensing fee, my blood-pressure would rise dangerously." There was general agreement, but another pointed out it had all the appearance of being some proprietary which the doctor did not wish to prescribe by name, and knew the pharmacist would recognise; and so long as the pharmacist knew what it was he could dispense the ready-made mixture. Still if he didn't know it heaven help him! "But why on earth," I asked, "didn't the doctor prescribe the proprietary cough-stuff by name? He couldn't have thought he wasn't allowed to; or could he?"

* * *

An end to all this arrant nonsense about the glorious *liberties of medicine as it is practised at the moment!* The would-be consultant now has to stoop to all sorts of intellectually humiliating devices such as coaching (the prostitution of intelligence), performing hack work for "coaching colleges," or lecturing on anatomy or physiology at nights in obscure suburban technical colleges. In the intervals of such work he "devils" as no young barrister would ever be expected to in various hospitals, doing the greater part of the work of the hospital without any emolument in order that the honoraries may spend more of their time trying to collect the wherewithal to pay for the absurd standard of living set up by "Harley Street," and the hospital can pretend to pay its way. How can we expect young men trained in such a school to have any respect for the Hippocratic ideals? How could state medicine ever produce conditions more inimical to the mental and moral development of the so-called leaders of the profession? In general practice the same outlook prevails—what member of the profession is honestly capable of dealing with a waiting-roomful of 40 patients in two hours? Even the most experienced of consultants find that ¾ hour is the minimum time in which he can cope with one patient. How can the GP, who has been up all night attending one or more confinements, possibly do justice to a full day's programme next day?

I am no advocate of state medicine, but honesty compels me to wonder whether an efficiently run state system of medicine could possibly be worse than the present one.

* * *

The changing of the Guard at Buckingham Palace seems less impressive than it used to be, partly, no doubt, because one has grown more critical with the years and partly because khaki (especially battle-dress) has less æsthetic appeal than full-dress. The slow marching, however, is still almost up to Tattoo standard and the dressing and steadiness on parade leave nothing to be desired. I was a little shocked the other day to notice a corporal carrying his rifle at the slope with a downward slant of his forearm. That would never have done for my old chief, the Duke of Wellington. Or do I mean Earl Haig? It is hard to remember, it was all so long ago.

Parliament

ON THE FLOOR OF THE HOUSE

MEDICUS MP

At the end of the first world war the chief problem was one of employment; at the end of this war the main problem, and this time a world problem, will be food. The debate on the Indian food situation, the famine in Bengal and near famine in other provinces, threw a grey [illegible]

[illegible] "We are all Members for India," he said; "the main cause of the famine is that there are large numbers of people in certain provinces in India who have not the purchasing power to enable them to buy such food grain as will keep them alive." Prices have risen steeply, the general index about 300%, the price of consumer goods such as cotton and kerosene which the peasant wants to buy by some 100–500%, of food grains by about 500–700%, and of certain commodities by as much as 000%. This is grave inflation, and Mr. Pethick-Lawrence said there was no mystery as to what had caused it. "It is the spending of huge sums in India by the Government of India and by the British Government and the printing of paper money in order to pay wages and the rise in the costs of production without drawing off purchasing power from individuals in taxes, in genuine loans and in other ways." He went on to speak of the ineffective efforts of the Government of India to control prices and said that you cannot control prices unless you prevent inflation. To which you must add rationing and possibly subsidies for food production as in this country. At the 1913 harvest there was an actual shortage of grain crops and there had also been an actual export of food grains from India which must be stopped.

The Secretary of State for India rose at once after Mr. Pethick-Lawrence sat down and said of his speech, "I do not think I differed from him on a single point" of his analysis of the situation. But, Mr. Amery added, the problem is one of even wider dimensions. Lord Woolton had warned us that we are running into a world shortage of food. Mr. Wallace, vice-president of [illegible] food will be the dominat- [illegible] " [of food], said the [illegible] n to meet the over- [illegible] proper organisation [illegible] crisis beforehand is a question of life and death for millions."

The most damaging criticism of the Government's attitude came from Sir George Schuster, who was formerly finance member of the Viceroy's Council in India and whose recent book on India is accepted as an objective and authoritative discussion of today's problems in [illegible] contributory factors to the trouble have been, [illegible] meekness and vacillation of the Government of India, and secondly their total failure to devise and apply a sound financial policy." O [illegible] how to handle food [illegible] Amery and the India [illegible]

George to the final stage in the ascending steps of responsibility, the House of Commons, for, as he pointed out, it is expressly laid down in the 1935 Act that it is Parliament "upon [illegible] the welfare and advancer [illegible] Sir John Anderson, now [illegible] and a former governor of [illegible] e (or rather buffered it) b [illegible] had reached the peak of [illegible] not be over optimistic.

But this Indian situation, grave in itself as affecting 300 millions of people, is only an example of conditions much more widespread in the world than our own guarded, ordered and controlled war-time lives. Outside Great Britain, the Dominions and the Colonies there are vast areas of inflation and food shortage. What the conditions will be in Europe when Hitler is finally defeated is *difficult to prognosticate*. *What* is certain is that hunger and disease will present governments, and especially the health ministries and the medical profession, with a greater task than any they have hitherto been asked to undertake.

QUESTION TIME

Domestic Staff for Hospitals

Mr ERNEST BEVIN, Minister of Labour, in a statement made in the House of Commons on Nov. 4, said he had been giving [illegible] lack in a great part of this field of any recognised rates of pay or conditions without which effective action on a large scale was extremely difficult. He therefore appointed at the end of July a committee, under the chairmanship of Sir Hector Hetherington, to advise him as to the rates of pay and other conditions of employment. The report of that committee had been received. He proposed to accept its recommendations on the clear understanding that the charges or deductions for meals should be a matter for arrangement between the employing body and the employees or their representatives, subject to the provision that the charge or deductions for full and adequate meals should in no case exceed those specified in the report and that working clothing, where required, would be regarded as a charge on *the employing body*. *For the first* time he would have a firm basis on which to work, and where these conditions were fulfilled he would deal with recruitment to this work in exactly the same way as to any other form of important national service, whether in industry or the [illegible] *his aim that this service should be placed in the general estima*tion on a footing with any other industry and that it should offer suitable training, prospects of advancement, and proper [illegible] and so far as welfare was concerned, he intended to ask the Factory and Welfare Advisory Board to extend their scope and their membership to include welfare for domestic workers in institutions. He was also arranging that the welfare staff of his department, both at headquarters and in the regions, should include the welfare of these workers within their scope. Special courses of training for hospital cooks were already available, and he would seek the advice of the advisory com*mittee as to the directions in which these could be extended*. The further problem with which he was at present concerned related to the private household which was suffering undue hardship owing to sickness, childbirth, or other emergency. Plans for dealing with such cases were under consideration.

University Grants Committee

Mr EDMUND HARVEY asked the Chancellor of the Exchequer how often the University Grants Committee had met during the last six months, and whether, in view of the urgency of the equipment of the universities to deal with the postwar situation, steps were being taken by the committee to formulate appropriate plans.—Sir J. ANDERSON replied: The reconstitution of the committee has been under consideration for some time and I hope shortly to announce the [illegible] studying the various problems which will face them after the war. *The committee of vice chancellors and principals have* asked the University Grants Committee to undertake a review of these problems in order to form a considered estimate of the need for increased assistance from the Exchequer. This request will have to be considered as a matter of urgency by the reconstituted committee; meantime, the universities are being asked to formulate their postwar needs so far as they can be estimated in present circumstances.

Tuberculosis Allowances

Dr E. SUMMERSKILL *asked the Minister of Health whether* he was satisfied that the allowances given to patients suffering from tuberculosis were adequate.—Mr E. BROWN replied: The scales on which tuberculosis authorities are being reimwithin 12–24 hours of wounding, while our cases include many operated on by the advanced base team at longer intervals after wounding.

The time intervals in our series are given in table II. The figures in the later periods are too few for any deductions to be drawn. By primary healing is meant a sound dry wound with the stitches removed and observed for at least a week.

Table III shows the classified results. It will be seen that the proportion of wounds healing by first intention in our series was high and that in consequence the incidence of infective complications has been low. In the series of cases treated by the general surgeons (table V) the incidence of healing by first intention was much lower and the incidence of complications higher. This is in spite of the fact, as table II shows, that not all our cases were operated on within the first 72 hours of injury. An all-round figure of 85% primary union of head wounds (71% of brain wounds) means that the majority of cases reach the base requiring only rehabilitation of reparative treatment. The bogy of sepsis is largely dispelled.

The mortality figure has really little meaning, for the mortality in these cases depends to a great extent on how near you are to the front and what you operate on. Other cases must have died ahead of us in the field ambulances or on the battlefield, while 18 cases died before they could be operated on in the CCS. Of the deaths following operation, 18 out of 25 were caused by the initial brain damage, mostly within the first 24 hours of operation, but a few survived some days longer. Of these 18 patients 12 were comatose, and the other 6 in semi-coma; 5 had transventricular wounds; 2 had through-and-through wounds; and the other 10 had deep perforating injuries, 1 being cerebellar.

Of the remaining patients, whose death was not due directly to the initial brain damage, 1 had gas gangrene of the arm and brain and another died of an anaerobic streptococcal infection in a leg wound; while there was a case of pulmonary embolism on the 10th day. The 3 others had perforating ventricular wounds and died of the delayed effects of infection: one had a wound 6 days old and crawling with maggots when received and died of meningitis 12 days later; the other 2 developed meningitis 75 and 42 days after operation, the former immediately after reoperation for a retained bone chip and the latter in spite of the fact that all bone chips had been removed 42 days earlier.

It is still too early to give full figures for disposal of these patients; the majority have been followed for a period of three months, but some of the later ones for shorter periods than this. In general it may be said that all scalp wounds without other injuries returned to duty usually within 10 days to 3 weeks. This was also true of the simpler depressed fractures. Of the more severe cases almost all those without neurological signs, and about half those with abnormal neurological signs, could be expected to return to duty within about 3 months.

Conclusion

The peculiar circumstances of an actively moving campaign with ever-lengthening lines of communication demanded that head injuries be treated in the field. The figures in this series show that specialised neurological surgery can be carried out under these conditions, and that the result of treating head wounds early is a high proportion of primary healing and a low incidence of complications.

This work was made possible by the efficient organisation of the medical services of the Eighth Army and by the loyal cooperation of the unit (Major R. P. Harbord, anæsthetist; Captain S. H. Llewellyn-Smith, neurologist; Captain H. S. Slemon, surgeon; Captain F. J. Gillingham, general duties officer; and staff). I am indebted to Brigadier Cairns, consultant neurosurgeon, for his help and advice in writing this paper.

The conjoint committee of Epsom College will in February award an annuity of £34 to a spinster daughter of a duly qualified medical man. Candidates must not be less than years of age, and their annual income must not exceed 5s. Forms of application may be had from the secre- s office, Epsom College, Surrey, and must be returned an. 17.

CONCEPT OF A PSYCHOSOMATIC AFFECTION

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> "By the construction of new concepts we can enlarge the range of our perceptual experiences and so become acquainted with new facts."
>
> —F. G. CROOKSHANK in *Influenza and other Essays.*

THE purpose of this paper is to indicate some of the interesting results which follow from the adoption and use of the concept of a psychosomatic affection. As a preliminary I shall define this as "a bodily disorder whose nature can be appreciated only when emotional disturbances (i.e., psychological happenings) are investigated in addition to physical disturbances (i.e., somatic happenings)."

Recent research has shown the the affections covered by this tentative definition are numerous, and comprise many of the common diseases of general medicine. A list of some of these is given below. Admittedly a number of the labels embrace a diversity of symptom-complexes differing in ætiology, course, and pathology, but many of the illnesses designated by these terms—the majority in respect of the "definite" items—are psychosomatic affections in the sense of the definition.

Gastro-intestinal system
  Definite: duodenal ulcer; mucous colitis; visceroptosis; "stress dyspepsia"; some cases of constipation.
  Possible: gastric ulcer; gall-bladder disease; hæmorrhoids (non-traumatic).
Cardiovascular system
  Definite: essential hypertension; effort syndrome; neuro-circulatory asthenia.
  Possible: some cases of coronary thrombosis; angina pectoris.
Respiratory system
  Definite: asthma.
  Possible: hay-fever; allergic rhinitis; some cases of recurring sinusitis, recurring bronchitis, and recurring tonsillitis.
Genito-urinary system
  Definite: nocturnal enuresis; vaginismus; some cases of menstrual disturbance and of leucorrhœa.
  Possible: Some cases of pyogenic urinary infection; of uterine fibroids; of enlarged prostate; of urinary bleeding.
Locomotor system
  Definite: many cases of "fibrositis," "neuritis," "sc tica," and "lumbago"; also of postural defe (e.g., scoliosis, lordosis and kyphosis).
  Possible: rheumatoid arthritis and some non-trauma cases of osteo-arthritis.
Endocrine system
  Definite: exophthalmic goitre, hyperthyroidism.
  Possible: some cases of glycosuria, diabetes, tetan obesity, and myxœdema.
Nervous system
  Definite: migraine, chorea, some cases of epilepsy.
  Possible: paralysis agitans.
Blood
  Possible: Idiopathic hypochromic anæmia.
Skin
  Definite: some cases of prurigo, eczema, pruritu psoriasis, urticaria, rosacea complex.
Eyes
  Definite: some cases of chronic conjunctivitis, chron blepharitis, miners' nystagmus.
  Possible: some cases of childhood squint.
Mental (the neuroses)
  Definite: the innumerable bodily disturbances of anxiety state and hysteria.

THE PSYCHOSOMATIC FORMULA

In this list the disorders mentioned seem to be superficially unrelated and in no way connected; but consideration reveals that many show peculiarities distinguish them from illnesses which are not psychosomatic (such as infectious diseases, accidents and deficiencies) and in virtue of which they possess a "form." These peculiarities relate both to the behavi of the illnesses in time and to the nature of

ey may be summarised con-
own in a six-point formula by
of a psychosomatic affection
becomes developed.

1. *Emotion as precipitating factor.*—Examination of patients in series shows that in a high proportion of cases the bodily process emerged, or recurred, on meeting an
2. personality tends to
affection.
3. *Sex ratio.*—A marked disproportion in sex incidence is a finding in many, perhaps most, of these disorders.
4. *Associations with other psychosomatic affections.*—Different psychosomatic affections may appear in the same individuals simultaneously, but the more usual phenomenon, as revealed in their natural history, is that of the alternation or of the sequence of different affections.
5. *Family history.*—A significantly high proportion of cases give a history of the same or of an associated disorder in parents, relatives and siblings.
6. *Phasic manifestation.*—The course of the illness tends to be phasic with periods of crudescence, intermission and recurrence.

EMOTION AS A PRECIPITATING FACTOR

When we investigate patients with psychosomatic affections, we find that the illness is often precipitated by an emotional disturbance which was an understandable response to a clearly recognisable disturbing event or events. Sometimes, however, the nature of the event seems petty in the objective sense and inadequate by
itself to acc
" normal "
the persona
history, suc
reason—be

Controlled investigations of a series of unselected patients have been made in a number of affections

hildhood.

PERSONALITY TYPE

When we meet an individual we receive certain im-

certain types of
on the genera
external expres
facies but also
ment); on his
wardly in pall
and also on ir
which arouse intuitions belonging to the order of "hunches." Psychological investigation of disposition does, however, allow some of these hunches to be described in a communicable way.

The intuitive idea that different types of syndrome or disease may be expressions of different types of personality applies especially to psychosomatic affections. Studies of personality in relation to disease have made

sonality takes account of traits relating to intelligence, dispositions and character. This approach is still being developed but it may be said that so far no adequate method of assessing types has yet been devised. Fou
broad types have, however, been described.

Hysterical or histrionic type.—This is associated wit
hysteria in its somatic manifestations whether sensori-moto
disturbances (such as paralysis or spasms, anæsthesias o
severe pains), or autonomic disturbances (such as vasomoto
flushes or rashes).

-Exemplified in asthma.
ver-active, "ulcer" type.—
ertain cases of fibrositis and

g, "rheumatoid" type.—Exem-

Persons who develop psychosomatic affections commonly show notable obsessional trends—a term which refers to certain compulsive performances in daily routine such as always being punctual, always orderly and tidy, always very clean, always " doing one's duty "—in short, being generally fixed in one's ways and set in one's ideas,

SEX RATIO

A disproportion in sex incidence is a finding in many, perhaps most, of these affections. The excess is in males for some affections (e.g. childhood asthma, duodenal
chorea of childhood,
disease, rheumatoid
ther things, the im-
portance of the endocrine system as a mechanism in the mediation of these affections. It cannot, however, be related to physiological sex differences only, because

the ratio over a period of
last century peptic ulcer
during recent years came
males. Conversely, diabe
was a disease of males, ha
preponderates in females. These facts suggest that the emotions must be taken into account in any adequate understanding of these affections. It is evident, however, that though disproportion in the sex incidence seems to be a finding for most psychosomatic organic affections,
qua non of all psycho-
time. Lastly, the sex
sychosomatic affections
proximately equal sex
diseases.

ASSOCIATED, ALTERNATING AND SEQUENT AFFECTIONS

Diff
appear in the
same
usual pheno-
menor
ce, of different
affections. Adequate records of associated, alternating and sequent affections are not yet available and except for the definite grouping of asthma, eczema, prurigo, migraine and enuresis, only occasional remarks on the subject are found in the literature. Ryle (1930) in discussing the " visceral neuroses "—a term under which he

which the symptom-complexes are *synchronous* so that we may observe " simultaneously or concentrated within a period of hours or days ": (*a*) the symptoms of shock with a profound fall in the blood-pressure, tachycardia,

Sequent affections.—There are some casual references in published work to the time sequence of psychosomatic disorders. Wilson (1939) states that exophthalmic goitre may precede the onset of peptic ulcer but apparently seldom follows it. I have pointed out (Halliday 1941) that the sequence of peptic ulcer, fibrositis, and bronchitis is not uncommon in the medical history of middle-aged insured persons who have been for long periods on the sick list. It is possible that the changing endocrinological setting associated with particular phases of the life cycle may be one of the factors determining such sequences. The adult, like the child, may "grow out" of one affection, but he may grow into another.

Repertories of disease.—To illustrate the phenomena of an individual's range of affections, or repertory of disease, two examples are given below. In both cases, the symptoms were responses to upsetting external events or periods of stress and strain. When one affection played Hamlet the others usually left the stage. Any medical man will find numerous analogous cases in his everyday practice.

CASE 1.—A man aged 40. Athletic build, pleasant and superficially sociable. Active and full of schemes. Often incapacitated. His repertory from the age of 26 has included: hysterical neuritis and paralysis of the left arm; anxiety state, followed by "lumbago," which was replaced by acute religious conversion; recurring sinusitis; recurring duodenal ulcer, sometimes with severe bleeding.

CASE 2.—A woman aged 37. Small, dark, with visceroptosis, tense and active and rigid in routine. Seldom incapacitated but "works on." Her repertory from the age of 24 has included the following, all of which have been recurrent: *spastic colon, with spitfire diarrhœa; floating kidney* symptoms; left-sided hemicrania; sore feet; facial eruptions of the rosacea complex; hypochromic anæmia with feelings of difficulty in swallowing.

MENTAL DISORDERS AS ASSOCIATED AFFECTIONS

Psychoneuroses.—A study of the natural history of psychosomatic affections shows that psychoneurotic illnesses may accompany psychosomatic organic diseases or may appear as preceding, alternating, or sequent disorders. During the course of psychoanalytical treatment this switching over is sometimes illustrated dramatically when, as a mental symptom becomes alleviated, a somatic manifestation takes its place. Such somatic manifestations are not necessarily one of the usual accepted bodily disturbances of anxiety state or hysteria, but may take the shape of organic expressions such as sore throat, hæmorrhoids, bronchitis, skin eruptions or fibrositis.

Idiopathic psychoses (*schizophrenia, manic-depression, paranoia*).—It has been suggested that the appearance of an idiopathic psychosis renders a psychosomatic expression unnecessary—a statement which is only partially true, since patients with these disorders often show functional disorders of the alimentary tract, vasomotor and trophic disorders of the skin, as well as abnormalities in posture. There is, however, some rather loose evidence suggesting that among sufferers from the psychoses certain common psychosomatic affections such as peptic ulcer, rheumatoid arthritis and fibrositis are relatively rare.

Psychosis and psychosomatic organic disease may alternate.

I remember a woman who at the age of 28 developed rheumatoid arthritis the activity of which persisted until 3 years later when she became mentally affected and was admitted to a mental hospital. During her 4 years of residence there the arthritis was quiescent but on her recovery to sanity and discharge home it recrudesced until she became completely crippled.

Mental illness and the psychosomatic formula.—A study of relevant data provided by textbooks of psychiatry shows that the separate mental disorders classed under the headings of the psychoneuroses and the idiopathic psychoses comply with the psychosomatic formula in respect of precipitating emotions, personality type, disproportion in sex incidence, positive family history and phasic manifestations—a finding which points to some kind of correspondence, connexion, equivalence, or relationship between psychosomatic affections and mental disorders.

FAMILY HISTORY

Accurate studies of the family history in patients with psychosomatic affections are not numerous. Textbooks usually dismiss the subject by phrases such as "inheritance is important" or "a family history is common." Special investigations have, however, been carried out in a [illegible] number of psychosomatic affections set out [illegible] these indicate that a significantly high pro-[illegible] cases give a history of associated disorders in [illegible]ngs and relatives.

The method of familial transmission is still undecided. Only a proportion of a family become affected. In certain cases no positive family history is obtainable. Genetic (or mendelian) inheritance has not been established in respect of individual psychosomatic affections but there does seem to be inherited a kind of weakness, sensitiveness or inadequacy. There may perhaps also be inherited a predisposition to special patterns of bodily reaction, but this cannot be stated with certainty because of the difficulty of disentangling inherited predisposition from predispositions early acquired through "psychological infection" from the parents giving rise to habits of faulty reaction which become fixed. A psychologist described a similar idea in these words: "Parent-child resemblances in function and dysfunction need not be inherited but may arise through psychological tensions which recur in succeeding generations through unrecognised imitation and identification" (Wilson 1939). But whether biologically inherited or very early acquired the predisposition seems to be woven into the structure of the personality.

Finally it may be noted how common speech assumes that there are family repertories of disease: one family is "highly-strung" another "queer," another has weak stomachs, another is "not strong," another chesty.

PHASIC MANIFESTATION

The course of the illness tends to be phasic with periods of crudescence, intermission and recurrence. Rhythmic manifestations are a feature of all life whether viewed somatically or psychologically, but in the case of psychosomatic affections the rhythm is an irregular one, as may be noted from studying over a period of time patient with peptic ulcer, asthma, rheumatoid arthritis, fibrositi and gall-bladder disease. Each major phase of crudescence varies in severity and has no standard duration In different people and in the same people on different occasions, the duration may vary from hours or days to months. Each stage is followed naturally by an interva of absence or subsidence, but this is of no constant length The study of the behaviour of these affections indicates that this negative phase does not necessarily represent—as is sometimes optimistically imagined—"a cure resulting from treatment." Sometimes the primary illness subsides never to return; sometimes it assumes a progressive fulminating quality; and sometimes it merges into chronicity. However, the usual course of these affections is that of irregularly phasic appearances

Investigations have shown that the irregularity in the appearance of phases of crudescence is associated with the irregularity in time of disturbing or distasteful externa events. Conversely the initiation of a negative phase may be related to the removal of disturbing circumstances or the interposition of favourable happenings. "Why does he get better when he does?" is a question answered by the ætiology of natural recovery. Lastly, minor phasic exacerbations or remissions are sometimes associated with cyclic endocrine activity. It is said that menstruation usually worsens the symptoms in asthma and exophthalmic goitre, whereas the endocrine "imbalance" of pregnancy sometimes brings about a subsidence of rheumatoid arthritis or psoriasis.

APPLICATION OF THE PSYCHOSOMATIC FORMULA

The affections mentioned below were chosen solely because data relating to them were readily available. The items under the heading of personality are, however, for reasons previously mentioned, somewhat defective. Adequate basic data for many of the psychosomatic affections mentioned in the list does not seem at present to exist. Where the origin of the reference is not given, the source of the authority is one or more of the standard textbooks of medicine. All are recognised as being phasic.

DUODENAL ULCER

1. *Emotion.*—In serial investigation, the proportion of upsetting external events at onset is significantly greater than in controls (Wilson 1939).
2. *Personality.*—*Persons who develop duodenal ulcer* usually show on the surface an over-emphasised activity, efficiency and independence. They are especially susceptible to threats to security (including problems relating to occupation and finance) or by the anxieties

engendered by being in charge or in authority (Wilson 1939). Many of them show a [illegible] relentless [illegible] compulsive [illegible] very early [illegible]

3. *Sex.*—Three to four times commoner in males than in females (Bell 1940).
4. *Associated affections.*—Migraine, hypertension, "fibrositis."
5. *Family history of psychosomatic illness.*—Four to five times commoner in cases than controls.

HYPERTENSION

1. *Emotion.*—Mental stress, excitement [illegible] are [illegible]
2. [illegible] ulcer"
3. [illegible] 1940).
4. [illegible] migraine, hyperthyroidism, peptic ulcer.
5. *Family history.*—About twice as great in cases as in controls (Brown 1936).

RHEUMATOID ARTHRITIS

1. *Emotion.*—In serial investigation the proportion of upsetting external events at onset is greater than in controls (Cobb et al. 1939).
2. *Personality.*—Persons who develop rheumatoid arthritis show definite emotional self-limitation and self-restriction. They tend to be independent and self-sufficient, keeping themselves to themselves. They are self-sacrificing and show obsessional trends: for example they may be over-tidy, over-cleanly, over-conscientious, a slave to routine and with a heavily developed sense of duty (Halliday 1942).
3. *Sex.*—Three to five times commoner in females than in males.
4. *Associated affections.*—Psoriasis, iridocyclitis.
5. *Family history.*—A positive family history in 30–40%.

EXOPHTHALMIC GOITRE

1. *Emotion.*—In 85% of over 3000 cases there was a clear history of a well-defined upsetting external factor (Bram 1927).
2. *Personality.*—Nervous, impatient, irritable, tending to violent emotions (Brown 1936).
3. *Sex.*—Eight times commoner in females than in males.
4. *Ass*[illegible] peptic ulcer.
5. [illegible] igh and includes also a [illegible] nervousness" (Donnison 1937).

FIBROSITIS

This is distinguished from the pains and stiffness of hysteria and depressive states.

1. *Emotion.*—"No controlled statistical studies, but frequent" (Halliday 1941).
2. *Personality.*—Not yet adequately described, but shows a correspondence with the ulcer personality; obsessional trends are not uncommon (Halliday 1941).
3. *Sex.*—No reliable statistics available because of confusion with fibrositis and hysterical pains.
4. *Associated affections.*—Peptic ulcer, bronchitis, anxiety states.
5. *Family history.*—Incidence high (Buckley 1938).

ASTHMA

1. *Emotion.*—Important.
2. *Personality.*—An intelligence much above the average; irritable and aggressive, quick to respond; over-anxious, insecure and lacking in confidence; this hypersensitive personality stands tension very badly (Rogerson 1943). Characterised by lack of self-confidence and need for love and protection. To compensate for this underlying tendency, various defence reactions may be employed—e.g., being very good and helping and protecting others, or alternatively, seeking to obtain attention by particularly aggressive behaviour (French and Alexander 1941).
3. *Sex.*—In children two or three males for every female but in early adult life the sex incidence is equal (Bray 1931).
4. *Associated affections.*—Eczema, prurigo, migraine, enuresis.
5. *Family history.*—In 30–60% (Bray 1931).

MUCOUS COLITIS

1. *Emotions.*—Important.
2. *Personality.*—(*a*) Morphologically: among cases of [illegible] colon there [illegible] persons (Ry[illegible] muscular te[illegible] concomitant of autonomic instability. (*c*) The person usually shows obsessional trends; depressions are not uncommon (White et al 1939). Not unlike the allergic personality.
3. *Sex.*—Four to five times commoner in females.
4. *Associated affections.*—Asthma, urticaria, effort syndrome.
5. *Family history.*—High incidence.

CHOREA

1. *Emotion.*—Emotional stress, especially if of long duration, is important (Hubble 1943).
2. *Personality.*—"Nervous instability characterised by a quantitative increase in emotion and kinesis." The peculiar excitability of the chorea personality is often concealed unde[illegible] Usually above the aver[illegible] 3). Has resemblances t[illegible]
3. *Sex.*—Three times [illegible] (Hubble 1943).
4. *Associated affections.*—Rheumatic fever, night terrors.
5. *Family history.*—Doubtful; significant in rheumatic fever, however (Draper 1936).

AGE OF ONSET

Each biological period of the life cycle, perhaps partly because of its particular endocrine balance and partly because of the kind of stresses encountered at that time, seems to be a danger age for the primary manifestation of particular affections. When psychosomatic disorders are arranged according to the maximum distribution of age of onset at least four main groupings may be distinguished. Further statistical investigations will, however, provide further and more adequate groupings.

I. *Infancy.*—Exemplified by asthma in which the distribution of the age of onset is at its maximum in the first year of life. It falls steadily to the age of 20, rises again slightly to age 30, and thereafter declines (Bray 1931).

II. *Childhood.*—Exemplified by chorea in [illegible]

I[illegible] skin diseases, [illegible] miner's nystagmus, psychoneurotic breakdown, manic-depression, and schizophrenia.

IV. *Adult Decline* (ages 40–60).—The time of onset in this group is probably related to difficulties in adaptation to a lessening prospect in bodily strength, physical love, career, and finance. Accurate distributions of onset are not available. The group may include: hypertension (certainly its end-results; [illegible] inly gall-stones); recurring br[illegible] bronchitis and emphysema); ar[illegible] Among the last I have noted a generalised eczema, which, like Job's dermatitis, occurs after a series of desperate personal calamities. Among the psychoses, paranoia seems to fall into this group.

Speculation has suggested that different persons in virtue of their particular inherited predisposition are, so to speak, "wound up" to go for a certain time, at the expiry of which their fated mode of psychosomatic behaviour must become manifest. This [illegible], however [illegible] does not, however, seem to fall into the psychosomatic category).

CONCLUSION

The concept of a psychosomatic affection in its developed form brings into relationship a [illegible] of seemingly [illegible] that many "[illegible] hitherto bee[illegible] medicine unc[illegible] headings of the various anatomical systems, may now be grouped under a unifying [illegible] cal category. The term psychosomatic therefore a valid symbol which provides a new instrument for thinking, for investigation, and for the direction of action.

For most helpful criticism and advice during the preparation of this study I am indebted to Mr. K. M. Abenheimer, visiting psychotherapist to the Royal Mental Hospital, Gartnavel, Glasgow.

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TRICHLORETHYLENE-AIR ANALGESIA IN CHILDBIRTH

AN INVESTIGATION WITH A SUITABLE INHALER

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TRICHLORETHYLENE has long been recognised as a potent analgesic agent. Hewer [1] has given a historical account of the investigations into the pharmacology of this substance and states: "Trichlorethylene exerts the most potent and rapid analgesia of all the volatile drugs with which I am familiar including nitrous oxide." Elam [2] has reported favourably on trichlorethylene analgesia in midwifery.

In an investigation carried out at Lewisham Hospital with an inhaler which provided a mixture of trichlorethylene and air 100 patients have received this form of analgesia over periods varying from 30 minutes to 7 hours. The stabilised product 'Trilene' was used.

EFFECTS ON THE MOTHER AND CHILD

Analgesia appeared to be satisfactory. No patient discarded the apparatus or said that it did not help. If for any reason a patient was temporarily deprived of the inhaler, she usually expressed a desire for it to be restored. Patients who were directly questioned stated that it had relieved them. Early in the investigation too great a concentration of trichlorethylene was given and in 5 cases transient loss of consciousness was produced at the end of the second stage when continuous inhalation was required. The apparatus was modified and anæsthesia did not occur subsequently in any case. Fourteen patients became incoherent and somewhat detached from their environment; despite this effect, they obeyed requests very well and cooperation was excellent. None developed restlessness and activity that might have hindered the midwife. All the other patients remained completely orientated but many had amnesia for the actual birth of the infant.

In a few—6 cases—distress was not completely alleviated. These patients were regarded as hysterical by the nursing staff. An increase of the vapour concentration to satisfy this group would probably have resulted in anæsthesia, even though trichlorethylene provides a broad margin between effective analgesia and anæsthesia.

With some of the longer administrations it was noted that the patient inhaled quietly and with less vigour than she had done earlier. This was ascribed to a slight but harmless cumulative action. It was appreciated that the value of any form of analgesia requiring the use of an apparatus may lie to some extent in diversion of the patient's interest.

The *uterine contractions* were not affected in frequency or character in most cases. With one patient it was felt necessary to discontinue the administration because of inhibition of the pains. This incidence is not significant, and is in contrast to the findings of Elam [3] who, however, gives no account of the technique employed. The tone of the uterus after labour was excellent, and this was supported by our experience with trichlorethylene for anæsthesia in midwifery.

Subsequent anæsthesia.—The analgesia did not appear to prejudice the patient or the infant when subsequent anæsthesia was given for instrumental delivery (12 cases in this series) or for any other purpose. Trichlorethylene with nitrous oxide and oxygen was usually employed.

Toxæmias.—Chlorinated compounds related to trichlorethylene are notoriously liable to damage liver and kidney. It might well be considered that this substance would be unsuitable in cases complicated by toxæmia, but the toxicity of trichlorethylene is low. It has been used for anæsthesia on jaundiced patients without ill effect; and in experiments with animals, only after long daily administration for many months were slight hepatic and renal changes demonstrated. Starting with mild analgesia for milder cases, the use of the mixture was extended to all grades of pre-eclamptic toxæmia, even those requiring it for long periods. No harm resulted. There has been no opportunity for using this method in cases of eclampsia, but there seems every reason to recommend its use when procedures likely to induce convulsions have to be performed.

No *cardiac arrhythmias* were observed either by myself or the sisters of the department, who were particularly requested to look out for this complication.

Cardiac disease.—There were 12 patients with mitral stenosis in this series. All obtained satisfactory analgesia. Since the inhaler provides a mixture with almost the same oxygen content as air and no respiratory effort is required in its use, it is free from the objections to nitrous-oxide and air analgesia.

Effects on the infant.—Six infants gave concern at birth owing to delay in beginning respiration. In each case causes other than the analgesia appeared to be responsible—prematurity, precipitate birth, breech presentation, prolonged second stage, and the cord rather tight around the neck. Where analgesia was employed over long periods the babies seemed unharmed. No intrapartum deaths occurred.

After-effects.—Mothers were not questioned specifically as to after-effects, but none complained spontaneously of the headaches and dizziness which have been observed by Hewer. The absence of these symptoms is probably due to the natural sleep that follows delivery.

THE INHALER

The inhaler (see figure) consists of a 4 oz. honey jar with metal cap to which is attached an inverted filling tube so arranged that it is impossible to introduce an excessive quantity of trilene. Thirty c.cm. (1 oz.) is the amount required, and is sufficient for 3–4 hours use. Trichlorethylene vapour of analgesic potency is inhaled by drawing atmospheric air through the portion of the jar above the surface of the liquid. A tube, extending to the centre of the jar and having a centrally placed partition throughout its entire length, passes through the centre of the cap above which it intersects a cross-tube at right angles. The partition in the vertical tube is extended into the horizontal one but does not completely occlude it, a hole of predetermined size being situated at the centre of the extended portion. The branch of the horizontal tube adjacent to the filler accommodates an inspiratory valve and the opposite arm tapers to fit directly into a standard face-mask.

When the patient inhales, most of the air which is drawn in through the inspiratory valve passes along the horizontal tube through the hole in the baffle; a small proportion takes the alternative route through the honey jar, where trichlorethylene vapour is entrained. An expiratory valve, placed above the vertical tube, is

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O. Langton *Proc. R. Soc. Med.* 1942, 35, 463.
J. *Lancet*, 1942, ii, 309.

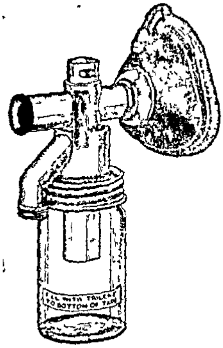
3. Elam, J. *J. Obstet. Gynæc.* 1943, 50, 120.

provided for the patient's exhalations. The apparatus has been proportioned to ensure that a mixture of only analgesic potency is inhaled. The mean concentration is 8·2 mg. of trilene per litre of issuing mixture at continuous flow. This represents 0·65% of trilene (weight in weight) in the trilene-air mixture.

An additional precaution against anæsthesia is the provision of an air orifice on the tube to which the face-mask is attached. The orifice is covered by the index finger of the hand that holds the instrument, incomplete occlusion resulting in free admission of air directly to the patient.

It is impossible for the liquid either to be spilt or to enter the respiratory passages whatever the position of the inhaler.

It was thought that the inhaler and the mask should be attached directly together rather than have a length of rubber tubing between them because of the saving in rubber and the greater portability.



The Trilene Inhaler.

TECHNIQUE

The patient comfortably holds the inhaler with the right hand. A short length of tape from the inhaler tied to the wrist prevents it from falling to the floor should she loosen her grip. The proper [illegible] the patient's respirations while attending to other matters.

Administration is essentially the same as for gas-and-air: inhalation throughout each pain if employed in the first stage; inhalation and breath-holding for the pains of the second stage; and continuous inhalation during actual delivery. A watch should be kept on the patient to ensure that inhalation is not continued after a pain has ceased. Requests to the patient during a pain may have to be made in a loud voice.

A fresh amount of trichlorethylene should be used for each case. About 5–10 c.cm. of the liquid is usually vaporised per hour. The remainder is somewhat diluted by water condensed from the patient's breath since there is slight partial rebreathing.

CONCLUSION

This preliminary report encourages a wider investigation.

Adequate analgesia safe for mother and infant was provided by this inhaler. The advantages are as follows: there seem to be no contra-indications to its use; the inhaler is simple and portable, and the vapour concentration cannot be increased; the method is inexpensive and, like the gas-and-air method, could be used by suitably trained midwives. The portability of the inhaler makes it convenient for domiciliary use.

SUMMARY

An investigation into the use of a trichlorethylene-air mixture as an analgesic in midwifery has been made. Satisfactory results were obtained with the mothers, and the infants were unaffected. Toxæmic cases and subjects with rheumatic heart disease were included.

An inhaler has been constructed and its advantages explained.

My thanks are due to Dr. W. Allen Daley, medical officer of health, and to Dr. [illegible] olds, medical superintendent of [illegible] ssion to make this investigation [illegible] to Dr. Amy Fleming for her advice. The inhaler is made by A. Charles King Ltd., and I wish to express my thanks to Mr. King for his interest and help. Dr. R. P. Liston of Imperial Chemical (Pharmaceuticals) Ltd. kindly provided the analysis of the trilene-air mixture.

BLEEDING GUMS AND GINGIVITIS
IN NAVAL RATINGS

A. C. MACDONALD, M B GLASG
SURGEON LIEUTENANT RNVR

[illegible] to the prevalence of [illegible] Service personnel in [illegible] ice-Jones and Digby [illegible] that 12% of Army hospital admissions had bleeding gums, and, in a review of 3000 men, found that 20·5% in one unit had gingivitis. In this war Roff and Glazebrook (1940) showed that 17·6% of Naval trainees had gingivitis, and Ungley and Horton (1943) have investigated cases of sore and bleeding gums in Naval ratings admitted to hospital. It was thought, however, that it might be of interest to keep a watch on the oral state of men under conditions of active service at sea. The following report is based on a survey of the incidence of bleeding gums and gingivitis in such men and on observations on the treatment of those conditions in a destroyer.

METHOD AND FINDINGS

To ascertain the incidence of gum lesions among Naval ratings otherwise physically fit, the men of four [illegible] or ulcerated gums. [illegible] om small sea-going [illegible] group D were the personnel of a depot ship. Group A were under my personal observation for a continuous period of 14 months, while groups B, C and D were examined once only. All four groups were on full Service diet, and as they were able to [illegible] bases abroad canned fruit juice was issued daily and in groups B and C the men were encouraged to take multi-vitamin tablets.

Table I classifies all the cases into mild or severe gingivitis and lists the edentulous ratings. Mild cases are those in which clinical [illegible] swollen gums which bl[illegible] Severe cases are those [illegible] duration and is associated with fœtor, marginal ulceration, alveolar retraction and periodontal pocket formation, but adenitis is seldom found. [illegible] and should not be confused [illegible] gingivitis associated with [illegible] edentulous ratings are never af[illegible]

TABLE I—GUM FINDINGS IN RATINGS OF THREE SEA-GOING SHIPS (A–C) AND A DEPOT SHIP (D)

Group	Men examined	Total gingivitis	Mild	Severe	Edentulous
A	156	41 (26·3%)	24 (15·4%)	17 (10·9%)	6 (3·8%)
B	57	21 (36·8%)	15 (26·3%)	6 (10·5%)	1 (1·7%)
C	52	14 (26·9%)	11 (21·1%)	3 (5·8%)	1 (1·9%)
D	349	99 (28·3%)	84 (24·1%)	15 (4·3%)	32 (9·2%)
Totals	614	175 (28·5%)	131 (21·8%)	41 (6·7%)	40 (6·5%)

Table II shows the numbers and percentages of cases above and below 30 years of age.

TABLE II—AGE-DISTRIBUTION OF CASES OF GINGIVITIS

Group	Under 30 years		Over 30 years	
	Men	Gingivitis	Men	[illegible]
A ..	130	35 (27%)	26	[illegible]
B ..	50	15 (30%)	[illegible]	[illegible]
C ..	44	10 (23%)	[illegible]	[illegible]
D ..	187	13 (6·9%)	[illegible]	[illegible]
Totals ..	411	73 (17·7%)	[illegible]	[illegible]

The remainder of the [illegible] officers and men in group [illegible] tion for 14 months.

their condition spontaneously, 11 being typical cases of gingivitis as already described. Four were cases of acute ulcerative Vincent's infection of gums. Two cases were associated with Vincent's angina of the throat, having well-marked faucial ulceration with membrane formation and cervical adenitis. Smears showed fusiform bacilli and spirochætes, and all those 6 cases gave a previous history of sore and bleeding gums. Investigation of the whole of the ship's company was then carried out, revealing a further 24 cases of gingivitis. In this group, 3 cases of gingivitis (including 2 of acute infection) were under treatment for syphilis by intravenous organic arsenicals.

TREATMENT

Treatment was carried out by scaling on the lines described by Cautley (1943), but no vitamin preparations were given. Intravenous arsenicals seemed to be effective in the faucial infections, leading to cure in 8 days, and seemed to improve acute ulcerative gingivitis, but had no noticeable effect on the more chronic types of gum disease. After investigating the efficacy of mapharside, chromic acid, liquor arsenicalis, gentian violet and euflavine, it was decided that 10 % chromic acid followed by hydrogen peroxide produced the speediest results and was the most convenient agent for local application to the gums.

Treatment consisted, therefore, of thorough scaling of the teeth, and, for 2 or 3 days thereafter, the application of 10 % chromic acid followed in about a minute by hydrogen peroxide (10 vol.). These were applied on cotton-wool pledgets by means of forceps or a wooden applicator. Very acute or tender gums required to be treated for a few days with chromic acid and mouthwashes before scaling could be attempted. Almost all the cases treated had heavy deposits of tartar, thickest under the gum margin around the bases of the lower incisors and in the molar regions. The removal of this deposit was considered of the greatest importance for a rapid and complete cure of the gingivitis. The instruments used were a dental mirror and probe, and a set of four scalers. This treatment was carried out on board and was found practicable even in rough weather. All cases requiring fillings, extractions or cautery of residual "pockets" were referred to the dentist on reaching harbour, and his opinion was obtained in judging cures.

The criteria for cure were the healing of ulceration, cessation of bleeding from the gum and the reappearance of a healthy pale pink gum margin showing the "health line of Turner." This consists of a pale ischæmic line at the level of the mucoperiosteal junction and running parallel to the gum margin.

In the mild form of lesion cure was effected in 5 days with an extreme of 7 days, while the severe cases became normal in 7 days with an extreme of 12 days. The cases of acute ulcerative gingivitis and Vincent's angina were cured in 6–9 days. Recurrences, at the end of 2 months' observation, were 9 (22 %) in number out of the 41 cases affected.

DISCUSSION

A ship provides good conditions for a "closed community" investigation of a clinical type, for while there are no opportunities for laboratory procedures the follow-up of cases is easy. It is realised, however, that personal vagaries in the diagnosis of gingivitis tend to lessen the accuracy and value of comparative statistical surveys in this condition. In this survey 28 % of the men examined had bleeding gums or gingivitis. This figure, when compared with the results obtained in the last war among the Armed Forces (Semple, Price-Jones and Digby 1919), must be considered disturbingly high. A control survey should be attempted among civilians, for the condition is not confined to the Services, though Campbell and Cook (1942), in a year's work in a dental hospital, found only 65 cases of gingivitis among 2924 new admissions—i.e., 2·2 %.

In any consideration of disease of the gums attention must be drawn to the age of the patients. Up to roughly years of age tooth loss is accounted for mainly by caries, but thereafter the foremost reason for is gingival disease (the pyorrhœa of the lay). It is to be expected, therefore, that a higher percentage of gingivitis will be found after the age of 30. Table II confirms this point but shows that there is still a high percentage among younger men.

Bacteriological smears of the gums in this series produced mixed flora, Vincent's bacilli and spirochætes being almost invariably present. Since very similar smears were obtained from apparently normal mouths, it was not considered profitable to pursue this aspect of the subject, especially in view of the limited facilities available. It was noticed that several men under arsenical treatment for syphilis had ulcerative gingivitis with abundant spirochætes in the smears. This agrees with the findings of Goodridge (1942) and Ungley and Horton (1943). Bismuth overdosage was thought to be a contributory factor in my cases.

The surveys in groups B, C and D were carried out in spring, but all the cases of acute Vincent's infection of mouth and throat occurred during the winter, suggesting the importance of lowered resistance as a precipitating factor. Much controversy has revolved around the rôle of vitamins in infections of the gums. Roff and Glazebrook (1940), Campbell and Cook (1941, 1942), Blockley and Baenziger (1942), Stuhl (1943) and Kent (1943) consider ascorbic acid necessary to produce effective cures. King (1943) advocated the use of nicotinic acid, but did not find ascorbic acid of value. These workers also describe various types of general malaise and ill health in their patients. None of the Naval ratings in this series showed any clinical evidence of vitamin deficiency or general symptoms of ill health. In fact, many had noted no abnormality even of their gums until interrogated. Since accurate estimates of vitamin intake and excretion were impracticable, it was decided to adhere throughout to the ship's normal dietary regime without the addition of synthetic vitamins and to treat all the cases of gingivitis by local measures only. It is evident in this series that, despite a generous diet, a high incidence of bleeding gums and gingivitis has been found, and furthermore, that satisfactory results have been obtained by thorough local treatment without specific vitamin therapy. This appears to agree with the work of McNee and Reid (1942) and of Ungley and Horton (1943), who could find no relationship either in causation or therapeutics between lesions of the gums and deficiency of vitamin C or nicotinic acid.

After 2 months' observation, recurrences comprised 22 % of the series and were commoner among the more severe ulcerating lesions of the older men. Recurrence in the mild cases appeared to be due to inefficient scaling in the initial treatment, to chronic tonsillar infection, to the presence of unerupted or impacted molars, or to badly fitting partial dentures. In the older men the relapse usually started from a residual interdental "pocket" in which food and debris had become lodged. Recurrences are to be expected in this condition, and all cases of gingivitis discharged from hospital should be kept under observation by their medical officer.

It is thought that the congestion of Service life is conducive to the spread of gingivitis, but it was not possib to prove any contagion in this series. The cases we evenly spread through the different messes and depar ments of the ship, and officers and ratings were equall affected. It was perhaps significant that 5 out of the stewards and cooks on board had severe gingiviti Control of spread was attempted by the isolation of th dishes and cutlery of severe cases and by discouragin such evils as supplying hot drinks to look-outs on watc in a single cracked and unwashed cup.

It is suggested that the most profitable form of treat ment and prophylaxis in gingivitis is the provision o facilities for the routine scaling of teeth. Man-power i saved if this can be done by the ship's medical officer for treatment ashore involves upsetting the work of th ship while in harbour, and may necessitate replacemen of the affected personnel. Further, early and adequat treatment discourages the onset of the more seriou gingival lesions and eventual tooth loss.

SUMMARY

Examination of the Naval ratings from four ships on active service revealed that 28 % had bleeding gums or gingivitis. Diet seemed adequate in vitamins, and local treatment alone produced good results in from 5 to 9 days. Removal of tartar by scaling was considered to

be of the greatest importance in treatment and prophylaxis.

I wish to thank the Medical Director-General of the Navy for permission to publish this article, also Surgeon Rear-Admiral J. W. McNee, Dr. S. Lazarus and Surgeon Lieutenant (D) C. Ellison, RNVR, for help and advice.

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BACTERIOLOGICAL INVESTIGATIONS IN A MASS CHEST SURVEY

JOSEPH W. BIGGER, M D, SC D DUBL, F R C P, F R C P I
LIEUT.-COLONEL RAMC

EARLY in 1942 Major P. Kerley carried out a preliminary miniature radiography survey of Army personnel. Where a miniature film showed any abnormality, full-size films were made. Radiologically suspicious cases were admitted to hospital where they were investigated clinically by Major-General A. W. Stott, Ma[illegible] Bean.

Of the [illegible] 20 were referred to me for [illegible] which was more thorough [illegible]icable in similar surveys carried out on larger numbers. This paper is concerned only with this aspect of the survey.

The plan of investigation was to examine, from each patient, 10 specimens of sputum microscopically (direct and after concentration), 3 specimens of sputum by culture, and 3 specimens of fasting gastric juice by culture. For a variety of reasons it was not possible to carry out this complete programme on all cases.

The methods of microscopic examination did not differ materially from those generally used, but prolonged staining (10–15 minutes) in hot carbol-fuchsin, thorough decolorisation with both acid and alcohol, and brief counterstaining with 1% malachite-green were regarded as important.

For culture, Griffith's method was followed. Sputum or gastric juice was treated with an equal volume of 5% KOH at 37° C. for 45 min. and inoculated, without neutralisation, dilution or centrifuging, on slopes of culture media in screw-top bottles. It was the intention to inoculate four slopes (one of Loewenstein-Jensen's, two of Griffith's plain egg, and one of Griffith's glycerol-egg media) from each specimen; but for the earlier specimens only Loewenstein-Jensen's medium was available, and it in sufficient quantity to permit the use of [illegible]

FINDINGS

Tubercle bacilli were demonstrated microscopically or culturally or by both methods in material from 13 of the [illegible] he results, the patients [illegible] os on the opinion of the [illegible] ed by such laboratory methods as blood sedimentation-rates but completely ignoring the results obtained by bacteriological investigation.

Group I consisted of 4 patients in whom the radiological and clinical evidence was against a diagnosis of pulmonary tuberculosis. Of these, 3 were cases of pneumonitis (atypical pneumonia) and should not have been included in the investigation. A single specimen of sputum from one of these (no. 1) was examined microscopically and no cultures were made. The other two (nos. 2 and 3) were fully investigated with completely negative results. Patient no. 4, a man aged 47, was, on radiological evidence, believed to be suffering fron carcinoma or abscess of the lung.

Six specimens of his sputum were examined microscopicall in February without tubercle bacilli being found. On specimen of sputum was cultured at that time. When i became known that this culture contained tubercle bacill the patient had been temporarily transferred to anothe hospital for bronchoscopy. He was readmitted in April and in that month and May, seven further specimens of sputu were examined microscopically. The first five of these wer negative, the last two positive. Cultures were made durin this period from four specimens of sputum and three o gastric juice. Two of the sputum cultures were positive but none of the cultures of gastric juice. Exactly thre months elapsed between the day when the first positiv sputum culture was inoculated and that on which a specime of sputum was found to be positive microscopically. It i of interest that the finding of tubercle bacilli by direct microscopic examination coincided with the radiological demon stration of cavitation.

Group II consisted of 5 patients in whom the diagnosi of healed pulmonary tuberculosis with no evidence o activity had been made. In 3 of these (nos. 5, 6 and 7 all bacteriological results were negative. The other 2 (nos. 8 and 9) each yielded one positive culture (one from sputum and the other from fasting juice): all specimens examined microscopically were negative.

Group III consisted of one patient (no. 10) in whom the radiological diagnosis was recent pulmonary tuberculosis. Clinical signs were absent but the history of increasing fatigue was suspicious. Complete bacteriological examination yielded negative results.

TABLE I—RESULTS OF EXAMINATIONS

Group	Diagnosis	Patient no.	Tubercle bacilli		
			Sputum		Gastric juice (culture)
			microscopic	culture	
I	Pulmonary infiltration, considered to be non-tuberculous.	1	–	0	0
		2	–	–	–
		3	–	–	–
		4	+	+	–
II	Healed pulmonary tuberculosis: no evidence of activity.	5	–	–	–
		6	–	–	–
		7	–	–	–
		8	–	+	–
		9	–	–	+
III	Radiological evidence of bilateral fibrosis and cavitation: no physical signs.	10	–	–	–
IV	Active pulmonary tuberculosis suspected.	11	–	+	+
V	Active pulmonary tuberculosis diagnosed.	12	+	0	0
		13	+	0	0
		14	+	0	0
		15	+	0	0
		16	+	0	0
		17	+	+	–
		18	+	+	+
		19	+	+	–
		20	–	–	+

+ = Tubercle bacilli found. – = Tubercle bacilli not found.
0 = Not examined.

Group IV consisted of one patient (no. 11) with a diagnosis of pulmonary tuberculosis believed to be active. Eleven specimens of sputum were examined microscopically: all were negative. Four specimens of sputum yielded one positive culture. Three specimens of gastric juice were all positive culturally.

Group V consisted of 9 patients in whom a diagnosis of active pulmonary tuberculosis was made. In 5 cases (nos. 12, 13, 14, 15 and 16) the diagnosis was confirmed by finding tubercle bacilli microscopically in their sputa: cultures were not made in these cases. In 3 (nos. 17, 18 and 19) tubercle bacilli were found microscopically in sputum and culturally either in sputum or in both sputum and gastric juice. The last patient in this group (no. 20) is of interest. Twelve specimens of sputum were examined microscopically with negative results. Two specimens of sputum and two of fasting juice were cultured. Of these one specimen of fasting juice was positive. A specimen of pleural fluid from this case yielded tubercle bacilli on culture.

DISCUSSION

Bacteriological methods (if we accept as valid the single positive results in nos. 8 and 9) established a diagnosis of active pulmonary tuberculosis in 13 cases. In all the 10 cases in which active pulmonary tuberculosis was suspected or actually diagnosed on radiological and clinical grounds, the diagnosis was confirmed bacteriologically. In addition, tubercle bacilli were demonstrated in 2 cases with radiological evidence of healed lesions and with no clinical signs of activity and in one case where no radiological or clinical evidence of pulmonary tuberculosis was found until some time after the bacteriological diagnosis had been made.

Positive cultures were obtained from material from 8 cases. Cultures from 5 of these were injected into guineapigs, all of which developed typical tuberculous lesions in which tubercle bacilli were identified. There is no reason to doubt that all the cultures isolated were of tubercle bacilli.

Loewenstein-Jensen's medium appeared to be slightly superior to both Griffith's plain egg and Griffith's glycerol-egg media. No attempt to type the strains of tubercle bacilli isolated was made, but from the superior growth on Loewenstein-Jensen's medium (which contains glycerol) these were all believed to be of human type.

This investigation afforded an opportunity of comparing various methods of demonstrating the presence of tubercle bacilli in human pathological material. It established very clearly the fallacy of relying on one or even several microscopically negative examinations of sputum to exclude a diagnosis of active tuberculosis. In case 18 the fifth specimen examined was the first in which tubercle bacilli were found: in case 17 the sixth and in case 4 the twelfth specimens were the first found positive. Concentration was not found superior to direct examination of carefully selected portions of sputum, correctly stained. No specimen was found positive after concentration where direct examination had been negative.

The investigation also established culture of both sputum and fasting gastric juice as a practicable, valuable and early diagnostic method. In 4 cases cultures were positive although all microscopic examinations were negative. In 2 cases cultures of gastric juice were positive where both microscopic and cultural examination of sputum were negative. In one case tubercle bacilli were demonstrated in sputum by culture three months before their presence was detected microscopically.

The superiority of culture over microscopic examination is shown by comparing all the results in the 13 cases found positive by any bacteriological method (table II).

TABLE II—RESULTS OF CULTURE AND MICROSCOPIC EXAMINATION

—	Tubercle bacilli		
	+	−	Per cent +
Sputum (microscopic) ..	14	80	15
Sputum (culture)	9	15	37
Gastric juice (culture) ..	6	9	40

The percentages are given not because, with such small numbers, they have any validity but merely to facilitate comparison.

From the experience gained during this investigation the following scheme of bacteriological investigation is suggested as a practicable one which should be followed where there is radiological or clinical evidence of active pulmonary tuberculosis.

SCHEME OF INVESTIGATION

Three specimens of sputum should first be examined microscopically. Where these are negative, three specimens of sputum and three of fasting gastric juice should be cultured. Griffith's method is recommended and two tubes of Loewenstein-Jensen's medium and one of either the same medium without glycerol or of Griffith's plain egg medium should be used for each specimen. Medium without glycerol is included in order to facilitate the culture of tubercle bacilli type.

SUMMARY

1. Twenty cases from a miniature radiography survey were investigated bacteriologically.

2. In all the ten cases where active pulmonary tuberculosis was diagnosed or suspected, excretion of tubercle bacilli was demonstrated.

3. Tubercle bacilli were also found in material from 3 other cases in which a diagnosis of active pulmonary tuberculosis was not made on radiological or clinical grounds.

4. Culture of both sputum and fasting gastric juice was shown to be a practicable, valuable and early diagnostic method.

CONDUCTION-TIME FOR HUMAN PAIN SENSATION

G. GORDON, B M OXFD D. WHITTERIDGE, B M OXFD

(From the Departments of Physiology and Surgery, Oxford)

It has been known for some years that the alpha rhythm of the human electro-encephalogram, in subjects with their eyes shut, can be distubed by unexpected stimulation of the skin (Adrian and Matthews 1934). We have been interested to find out whether the time-interval between such a stimulus and the disturbance of the alpha rhythm is sufficiently constant to justify its use as an approximate measure of sensory conduction-time. Such a method would have the advantage of being objective, whereas the existing methods of assessing sensory conduction depend on the reaction-time, which involves an inevitable subjective element.

The method has several practical disadvantages. In the first place, it is essential that the subject should show a steady alpha rhythm, which is not liable to many spontaneous fluctuations, but which is easily disturbed by painful stimulation. It is our experience that a subject will have a steadier alpha-rhythm if he has been used for the experiment several times, and is no longer apprehensive; but even then, many people will be found unsuitable. For this reason, we feel that the method is only useful for experimental purposes.

Secondly, there is evidence that the effect of a stimulus will depend to some extent on the place in the alpha cycle in which it falls (Bartley 1941), so that measured differences of less than 0·1 sec. are unlikely to be significant, the normal frequency of the alpha rhythm being about 10 per sec. This limits the method to the investigation of conduction rates of about 0·5–5 metres per sec.

A sharpened steel wire was used as a stimulator, and the exact time of stimulation was recorded electrically.

RESULTS

In suitable subjects a needle-prick in the hand or foot is followed by a definite disturbance of the alpha rhythm (fig. 1). This effect is often more pronounced in the parietal than in the occipital region. In normal subjects light touch on the hand or foot does not usually lead to disturbance of the rhythm, though it may sometimes do so the first time it is applied. The response to needle-prick, however, is maintained until a large number of stimuli have been given.

The average time-intervals between the stimulus and the disturbance are given in the table. The values from the normal finger and toe do not differ significantly.

INTERVALS BETWEEN TIME OF STIMULATION AND DISTURBANCE OF ALPHA RHYTHM IN NORMAL SUBJECTS

Part stimulated	No. of observations	Av. time-interval (sec)	Standard deviation
Finger { normal ..	14	0·26	± 0·04
Finger { asphyxiated ..	10	1·04	± 0·11
Toe { normal	18	0·23	± 0·04
Toe { asphyxiated ..	12	1·40	± 0·20

It is recognised that cutaneous pain can be separated into two components, an immediate flash of pain, followed after an interval by a more diffuse "second pain." The first pain can be abolished by long asphyxia of the part, so that after an hour or more the second pain alone can be felt (Lewis and Pochin 1938). As other sensations are successively abolished during asphyxia, the second pain becomes definitely more unpleasant. It is probable that second pain is mediated by unmyelinated fibres, which conduct at about 1 m. per sec. and can resist asphyxia for longer periods than the lar [illegible] The fibres mediating "first [illegible] at 12–30 m. per sec. (Zotterman 1939).

We have studied the effect of second pain on the alpha rhythm, and have found that after the base of the finger or toe has been compressed with a cuff for an hour or more to occlude its blood-supply a disturbance of the alpha rhythm is only seen when a second or so has elapsed since the stimulus (fig. 2). The time-intervals are given in the table: the interval for the toe is significantly greater than that for the finger, corresponding to the greater distance travelled by the impulse before reaching the spinal cord. The duration of the disturbance which follows second pain is often greater than that following first pain.

The results obtained with first and second pain in normal subjects indicate both the degree of accuracy and the limitations of this method, and they were sufficiently encouraging to justify us in using the method with several cases of peripheral nerve injury which showed sensory abnormalities.

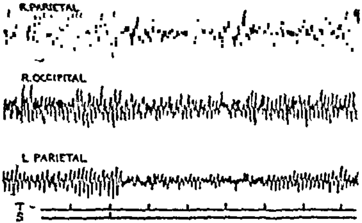

Fig. 1—EEG from a normal subject, showing the disturbance of alpha rhythm following a pin-prick on the left forefinger. The point of stimulation is shown by the signal (S). Time (T) is given in 1 sec. intervals. The disturbance occurs 0·3 sec. after the pin-prick.

Two of these patients showed a cutaneous *hyperpathia* affecting the foot (Head's protopathic sensibility). Both men had sustained gunshot wounds injuring nerves in continuity: *in one, the posterior tibial nerve was injured at the* ankle, and in the other the sciatic nerve had been injured six months previously near the sciatic notch. In the first man, with a lesion near the ankle, there was no appreciable abnormal delay between the stimulus and the disturbance of the alpha rhythm, the average time-interval being 0·24 sec.; but in the case of injury near the sciatic notch, the average interval was 0·45 sec., a figure significantly higher than that for a normal foot.

In the third case, hyperpathia was the result of an irritative lesion of the median nerve, a sequel to sepsis in the thumb. It was unaffected by removal of the appropriate digital nerve. In this case we could detect no abnormal delay in the response to pin-prick, the average time-interval being 0·21 sec.

DISCUSSION

This method is sufficiently accurate to enable us to distinguish easily between the conduction-times for human first and second pain, the latter being mediated by fibres conducting at about 1 m. per sec. We have also been able to distinguish between the conduction-times for second pair [illegible] These results confirm the [illegible] Pochin (1938), who used a [illegible]

Our results with 2 cases of peripheral nerve injury showing "protopa[illegible]" [illegible] have demonstrated that [illegible] delay in pain conduction of [illegible] pain. In both these cases, and in the case of irritative lesion of the median [illegible]es must be present. The d[illegible] in one case with a lesion n[illegible] to depend on the length [illegible] which was still incompletel[illegible] et attained its full rate of [illegible]

In tabes dorsalis (Pochin 1938), and in alcoholic neuritis (Stein et al. 1941), cutaneous dysæsthesia is often accompanied by delay in pain perception very similar to that of second pain, and these phenomena have been attributed to the destruction of the fast-conducting fibres. In the cases we have described however, where this delay is not present, we suggest that another explanation must be sought.

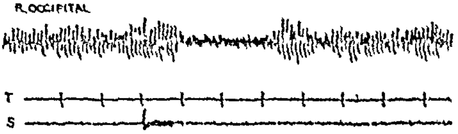

Fig. 2—EEG from the same subject, after the left forefinger had been deprived of its blood-supply for 90 min. The disturbance occurs 0·9 sec. after the pin-prick.

SUMMARY

A method is described by which the conduction-time for painful cutaneous stimulation can be approximately measured. Disruption of the alpha rhythm of the EEG is used as an indicator of a cortical disturbance. It is suggested that this method has experimental applications, since it has an advantage in being objective.

The results described and discussed above were obtained in normal persons, before and after asphyxia of the stimulated part, and in 3 cases of peripheral nerve lesion showing sensory abnormalities.

We would like to express our thanks to Prof. H. J. Seddon for his help and for allowing us to investigate cases of peripheral nerve injury under his care; to Mr. R. B. Zachary, who has helped us greatly in the selection of cases; and to Miss D. J. Dow for assistance with the experiments.

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New Inventions

FLEXIBLE FACEPIECE CONNEXION FOR CLOSED CIRCUIT ANÆSTHESIA

IT is common knowledge that a gas-tight system is essential for closed *anæsthesia*. The flexible connexion illustrated has been designed to overcome the drag caused by the corrugated tubes and facepiece connexion on circuit apparatus—a common cause of leakage—and it has proved remarkably *effective in* practice.

The facepiece is held in position by means of a Clausen harness with the addition of a chin strap. The chin strap shown provides a useful support for the jaw besides preventing the facepiece from being dragged upwards and away from the patient's mouth.

The apparatus has been made for me [illegible] *Industrial Equipment Ltd. of 12, New* [illegible]

L. W. MA[illegible]

Medical Societies

TUBERCULOSIS ASSOCIATION

On Nov. 19 the association met at 26, Portland Place, W.1, to discuss

BCG Prophylactic Inoculation

when an account of his experience in Norway was read for Dr. O. Galtung-Hansen by Dr. Dedecken. The early records of the period 1910–15 had shown that practically the whole population of the country had been infected in childhood, and the anti-tuberculosis campaign had been organised on the basis that adult tuberculosis was a recrudescence of this infection. The investigations on hospital nurses which began in 1924 had changed this outlook: only half the student nurses gave a positive tuberculin reaction on joining, but practically all were positive on the completion of training. Moreover it was observed that only 1% of the positive reactors developed clinical tuberculosis whereas 17% of the negative reactors became ill with the disease. Meanwhile, in 1926, Heimbeck had started the parenteral immunisation of these nurses on a voluntary basis by giving them BCG vaccine, at first subcutaneously and later intradermally. Analysis of the results showed that of the vaccinated nurses 2·6% developed clinical tuberculosis and 0·2% died, the corresponding figures for unvaccinated nurses being 17·1 and 1·8. Attention was next directed to university students with similarly good results. Finally certain mixed groups were inoculated. At that point came the Lübeck accident when a virulent strain of tubercle bacillus gained access to the BCG vaccine and caused a number of deaths. The publicity given to this tragedy discouraged for a time the vaccination but after an interval public anxiety was allayed and the scheme went forward again. The position at the time of the Nazi invasion was that students, nurses, house contacts, works contacts, fishermen, sailors, and children of school-leaving age were being inoculated. Some reluctance was encountered in coastal and isolated districts, but apart from this the scheme had been popular. Finally, 6000 soldiers had been inoculated, this time by percutaneous inoculation. The Nazis forbade the scheme and this ensured its popularity. Some 6% of inoculations gave rise to a local abscess which took a month to heal. Over 90% of the vaccinated became tuberculin-positive, but the duration of protection is not known and superinfection by contact with tuberculous persons is not excluded.

Lieut.-Colonel C. F. Bennett gave his experiences of Canada. Only two of the nine provinces had used BCG vaccine, of which his own province of Saskatchewan was one. This province had a very efficient general anti-tuberculosis campaign comprising: (1) voluntary segregation by institutional treatment until the lesion was closed (average period 13 months), with an allowance of 4·8 beds for every death, and no waiting-list; (2) a special tax to meet the cost of treatment which was free; (3) continuous educational propaganda so that tuberculosis was no longer regarded as inevitable or as a disgrace, but as something to be prevented, or diagnosed in its early stages and cured; (4) close liaison between the anti-tuberculosis organisation and the general practitioner; and (5) elimination of bovine tuberculosis by pasteurisation of milk. (Colonel Bennett did not think the standard of living was as important as it had been made out to be as a causative factor.) With this organisation the death-rate from tuberculosis had steadily declined and cases were admitted to hospital at a more curable stage. The infection-rate had fallen even faster than the death-rate. The incidence in 1942 was only 0·75 per 1000 population, to which mass radiography had added another 1·3. On this background BCG vaccine had been tried in two special groups: (1) Indian babies, (2) hospital and sanatorium nurses. In the latter the experience of his province had been similar to that of Norway; the negative tuberculin reactors accounted for most of the clinical cases (five times as many as the positive reactors). The vaccine had enhanced resistance by 75% and reduced breakdown in a class of the population exposed to grave risks. But it was, he thought, most unlikely that it would eliminate the need for early diagnosis and voluntary segregation.

Colonel R. S. Muckenfuss spoke of the experience with BCG vaccine in New York City. The work had been started by Park and on his untimely death it had been continued by Levien and others whose results were published in 1938. Children born into tuberculous households had been selected for the test. The results have not been statistically significant and he did not think they justified the general use of the vaccine.

Prof. Johan Holst gave his experience with the Norwegian Army. Some 3000 men had been inoculated, but too recently to warrant definite conclusions. No serious harm had resulted from the local cold abscesses which had occurred. He thought that vaccination should be carried out 2–3 months before the men went into infected surroundings. It was difficult to fit the vaccination into this period of training, especially as the vaccine must be used fresh and was at present difficult to obtain (they had received it from Sweden). In the first year after arrival in this country the incidence of tuberculosis among Norwegian troops had been high, but it was now declining. This decline could not be attributed to BCG but to measures (such as collapse therapy) taken to prevent open-case infection. Of the groups tested, the adolescents were especially important (factory workers, sailors and students) and it was essential for the inoculations to be given 2–3 months before exposure to special risks. The vaccination should of course be associated with other prophylactic measures.

Prof. Thos. Dalling recounted his experience with experimental inoculations of cattle at the Cambridge University institute of animal pathology. Because of local abscess formation, subcutaneous inoculation had been abandoned in favour of intravenous injection. Immunity was high for the first six months after vaccination and then began to wane. It could be reinforced at six-monthly intervals, giving rise to allergy with positive tuberculin reaction, which finally fell after the series. A small field trial had been made, but the results were not yet available. A larger field trial on several thousand cattle was now being made, farms being chosen which possessed tuberculin reactors; but it was not easy to establish satisfactory control tests and the trial would take 6–7 years to complete. As the vaccinated animals reached maturity they would be introduced into dairy herds. He had also made trials of a vole-bacillus vaccine (see *Lancet*, 1940, ii, 338) which he thought had given better results than BCG. It was a harmless organism.

Dr. A. Q. Wells described 3 cases he had vaccinated with the vole bacillus. All had become tuberculin positive. One had developed a local abscess. This bacillus did not produce progressive disease in guineapigs.

Prof. S. Lyle Cummins said he had started vaccination with BCG on 12 cases before the war but had abandoned it owing to official prohibition.

Dr. Peter Edwards (Market Drayton) mentioned his experience of the vaccine with a valuable dairy herd, in which the results were not yet complete. He was not prepared to use it in man.

Discussion then turned on the general principles of prophylactic vaccination.—Dr. M. C. Wilkinson (Black Notley) thought that vaccination should be done at the age when the reticulo-endothelial resistance of the lymphatic system is highest—viz., in late childhood.—Prof. W. H. Tytler stressed the importance of primary infection in adolescence at the present time. This offered, he thought, a favourable opportunity for prophylactic vaccination. Calmette had not claimed that the immunity in infants was lasting. The work on infection in nurses needed more statistical control. Environment was not everything; he quoted a rural district in Wales where living conditions were appalling and the proportion of tuberculin reactors was only 2%. The undiagnosed chronic infective case was the most important factor in all schemes of prevention.—Dr. E. Nassau (Harefield) argued that prophylaxis could not be expected to protect always. A sense of proportion was essential.—Dr. A. L. Jacobs (Paddington) thought the available data were now sufficient for assessing the value of BCG vaccination.

At the conclusion of the meeting resolutions were passed calling for a committee of inquiry into the possibility of using BCG in this country as a means of prophylaxis.

ROYAL SOCIETY OF MEDICINE

At a meeting of the section of medicine on Nov. 23, with Dr. Geoffrey Evans the president, in the chair, a discussion on

Nutrition in Enemy-occupied Europe

was opened by Lord Horder. Facts, he said, could be learned from the reports of qualified observers in the occupied countries; from examination of recently arrived refugees; and by considering the known rations allowed.

Colonel W. E. Vignal, MD, said that the intimate connexion between health conditions and food in France was shown not only by reports but also by a special minute which had been prepared by the Minister of Agriculture for the German authorities only. Few people could obtain normal quantities of food: the meat ration was 3½ oz. with bone, and even this was theoretical because of breakdowns in transport. The daily basic ration yielded 1081 calories for most people in France. German authorities estimated the minimum calorie value for health at 3000 calories; towards the end of the last war, when the German ration fell to 1000 calories, they called it semi-famine. Moreover the French diet was deficient in fat, protein, and sugar. There was little protective food, causing a general weakening of the organism. Tuberculosis was increasing alarmingly, and the German authorities [illegible] silence about it. The Vichy [illegible] that 35,000 of the inhabitants [illegible] were affected, and the number of young women patients was especially high. In one department the positive-sputum rate was nearly three times that of 1938. One report said that the ill-balance of the diet was more responsible than an absolute deficiency. The Germans had returned to France a large number of tuberculous prisoners, most of them urgently needing treatment; six weeks later they had been sent to their homes, to constitute a per- [illegible] of her sanatoriums and supplies, and patients had to wait six to eight months for institutional treatment. Acute [illegible] were common—and so was [illegible] eath. In 1942 there had [illegible] e general weakening revea [illegible] orms; sudden deaths with [illegible] minor ailments were ascrib [illegible] d vitamins, especially B. E [illegible] workers, and in some the loss of weight was catastrophic. The accident-rate had greatly increased. Many people suffered from a progressive asthenia and incapacity for effort, dizziness, retro-orbital or temporal headaches, night sweats, loss of memory, apathy followed by irritability and depression. The only clinical signs were low blood-pressure, loss of weight, hypoglycæmia and ascorbia. Other observers had described severe malnutrition syndromes, with and without œdema. The difficulty of finding food was begetting a vindictive and grasping mentality which augured ill for the future. The soap shortage made hygiene difficult; delousing and disinfecting posts had been installed to combat new infections carried by fleas and lice. Fortunately there had been only a little sporadic typhus. The condition of children was even more alarming: they showed loss of weight and a high incidence of tuberculosis; 90% of one group studied were 2–9 kg. underweight. Psychological disturbances were common and included inability to concentrate, enuresis, pilfering, psychological lying and epilepsy. The number of children coming before [illegible] them were likely to die.

UNDER-NUTRITION IN GREECE

Dr. A. P. Cawadias said that in Greece the Red Cross was on a war basis like the fighting services. The prodromal period of the famine lasted from 1939 till the fall of the country in May, 1941. Greece produced scarcely any food; most Greek wars had been wars for food, and the modern population relied on monthly shipments by sea. As soon as shipping became restricted, there was a state of malnutrition, which became much worse when Greece entered the war and all available food was diverted to the fighting men. With the fall of Greece the problem became acute; there was then no food in Greece. The confidence and fighting spirit of the country kept people going through the summer when something could be found in the countryside. The daily bread ration was 1 oz. In October real famine began. As usual with famine, the tragedy burst suddenly. Communal kitchens gave 400 calories a day, when they could, and fed 500,000 people. Well-to-do people in Athens had 1 oz. of bread alternate days, camomile tea and gruel, with oil and carrots, and chicory coffee. A thousand died in Athens every day of sheer starvation. Refuse lorries were loaded with bodies, thrown in pell-mell like sacks of cement. Sausages of dog, rat and cat meat were sold at outrageous prices. In six months 400,000 died. First of all to the rescue came the Greek Red Cross. The heroism of starving women of the upper classes, working for the Red Cross, was as unforgettable as that of the soldiers and sailors. Then the international Red Cross gave its guarantee, despite the difficulties of control. The British Government and the United States Government joined in, and, without any interference from the occupying authorities, began to feed Greece. That ended the tragic period, in March, 1942, and then began a nine-months period in which the calorie intake went up from 400 to 750 calories. From January, 1943, conditions had deteriorated; 32% of the necessary calories only were supplied, and all the hidden food and money in the country had been exhausted. The mortality was terrible; they had ceased bothering about tuberculosis, but now the incidence of malaria [illegible] nd other [illegible] achinery [illegible] Greece.

JUGOSLAVIA

Dr. M. Sekulich said that peace-time nutrition in Jugoslavia was dependent on meat in towns and vegetables in the country. The urban diet had adequate calories. The peasants ate meat in the winter and supplemented their vegetables with dairy products. Nutrition was not satisfactory because a third of the peasants ate bad bread, and a small number of people ate more than they needed, and most of the population consumed more than they produced. Generally speaking, rural children were underfed, even in self-supporting and surplus areas. Tuberculosis was found everywhere; bad housing was largely responsible. In enemy-occupied Jugoslavia there was a steady shortage of food; the enemy had taken all stores, and the peasants had destroyed food to prevent it falling into enemy hands. The army of occupation had to be fed, and the harvests of 1912 and 1943 had been small for many reasons. The shortage of draught animals, guerilla warfare, enforced transplantation of the population and change in use of the land by enemy order all combined to reduce the average calorie value by about half. There was both malnutrition and famine. All the consequences of malnutrition in peace-time were increasing from day to day. Two normal prewar harvests, with adequate transport, would restore prewar conditions.

BELGIUM

Prof. J. Young, FRCOG, quoted a paper by Professor Heymans, of Ghent, which reached this country. The author had had access to official data and had suffered severely from the Nazi authorities as a result of publishing this paper. The daily basic ration in 1912 was 1230 calories—i.e., it was 50% efficient. Certain classes were allowed supplementary rations, but although rations were adequate for the youngest children they became worse as age advanced. A loss of weight of 10–15 kg. was common. *A striking fall of plasma proteins* appeared even without loss of weight. Primiparæ gained only 81% of the prewar weight figure and multiparæ 78%. Tuberculosis was a grave problem; supplementary rations were issued after a strict examinati the number increased from 69,000 to 88,000 in 1942. Admissions to sanatoriums, death-rates and sputum tests showed the same increase. The latest figures were peculiarly disturbing.

Dr. IZOD BENNETT hoped that no English man or woman present would lose an opportunity of bringing home to their fellow countrymen the appalling situation of starving Europe. He emphasised Colonel Vignal's reminder that the Germans proclaimed to the world in the last war that 1600 calories a day was semi-starvation and were now allowing to the peoples of Europe 1000–1100 calories a day—if they could get it. He hoped that doctors would insist that calories were wanted—not vitamins. He had a fearful mental picture of ships loaded up with little capsules—when food was wanted. It was generally agreed that if you looked after the calories the vitamins would look after themselves. A vitamin given as a natural food achieved far more than a synthetic concentrate. Malnutrition was now a chronic problem, not an acute one; people were suffering from under-nutrition which had gone on for two, three or four years, and they must be given ample nutrition over a considerable period before they could approach normal health. A young Frenchman arriving in this country a fortnight ago had looked round at the dock workers and exclaimed "I suddenly realise that two years ago we were men like that!" The supplementary ration must be rich in first-class protein and vitamin-containing fat. Only thus could the lives of the young, the pregnant and the early tuberculous be preserved. Of all the epidemic diseases threatening Europe today tuberculosis was the major one. When refugees and prisoners returned from forced exile they would be riddled with it, ready to distribute it among the urban populations of their own lands. Some sieve must be devised to prevent this; at this moment the authorities should be actively preparing mass miniature radiography sets for Europe. Such sets offered the one hope of preventing widespread epidemic. Clinical and pathological examination was impossible; an expert physician or bacteriologist could deal with no more than 50 cases a day. Ordinary radiology could be used to diagnose 200 cases a day—mass radiography, over 500. British scientists might save many lives by getting in touch with scientific societies among the allies.

BRITAIN

Dr. G. MARSHALL felt a little relief that the figures for tuberculosis in occupied countries were no worse. We must begin by finding out how to tackle the problem at home. Tuberculous meningitis had increased by over 200%. Many had died who would not be expected to die in times of peace, and nobody quite knew why. This was a time for research and for increased instead of decreased facilities for treatment. We did not know what supplementary rations patients required. The results of treatment now were not as good as in times of peace.

Other speakers insisted on the need for determining the precise effects of dietetic supplements.—The PRESIDENT agreed but pointed out that the increase of tuberculosis was only 10–12% in England and Wales, 20% in Scotland, whereas in France it was 30–40%, in Belgium 60–65%; in Jugoslavia 100%.

General SICE described the tuberculosis found in escaped Frenchmen as very severe and rapid, fatal in 5–7 weeks. He thought it was associated with a special form of the bacillus.

Reviews of Books

Medical Clinics on Bone Diseases

A Text and Atlas. I. SNAPPER, MD, formerly professor of medicine, Peiping Union Medical College. (Lewis. Pp. 225. 67*s.* 6*d.*)

IN 1937 Professor Snapper gave two lectures in London on pseudo-tuberculosis in man. In the first he described Boeck's disease and in the second regional ileitis. He published them in Holland, in 1938, in a monograph illustrated by plates the beauty of which has never been surpassed: each measured 11 by 8 in., was of the consistence of a thin card, and had a magnificent glossy finish. The text was in English. Those interested soon discovered a companion volume, published in 1937, with the title *Ziekten van het Skelet*, which described hyperparathyroidism, Paget's disease, lipoidosis of the skeleton, and multiple myeloma. The text was in Dutch, and the illustrations of the same surpassing quality. In an extended form, enlarged by 25 pages and enriched by 8 extra plates, this monograph now appears in English. The added section describes Professor Snapper's experience in China of avitaminosis D, comprising fœtal rickets, infantile rickets, late rickets, and osteomalacia. No more complete description of generalised diseases of the bones has appeared in any language. The treatment is thorough; in each section, he deals with the history of the subject, clinical findings, radiological appearances, biochemistry, pathology, and differential diagnosis, and current English descriptions of these diseases are put to shame. Perhaps at last English teachers will cease to perpetuate Paget's view that the skull and the tibia are the commonest sites of osteitis deformans. Snapper agrees with Schmorl that the bones are affected in the following order of frequency: sacrum, spine, femur, cranium, sternum, clavicle, tibia. His original contributions to the subject of bone diseases include his discovery that the Hand-Schüller-Christian disease can occur in the absence of a craniohypophyseal lesion, and the fact that the biochemistry of multiple myeloma differs from that of hyperparathyroidism in the high level of phosphorus in the blood. His occasional misconstructions of English nowhere alter the sense but rather add relish to the text. The 30 exquisite plates include X rays, clinical photographs, and photomicrographs of histo-sections. Each chapter is followed by an extensive bibliography; that for hyperparathyroidism alone contains nearly 200 references.

Physiological Basis of Medical Practice

(3rd ed.) CHARLES HERBERT BEST, MD, DSC; NORMAN BURKE TAYLOR, MD, FRS. (Baillière. Pp. 1942. 55*s.*)

ONCE upon a time the medical student based his medicine (or at any rate was told to do so) on what he saw in the post-mortem room. The results were good but limited, for he came to believe that diseases which produced no post-mortem changes were imaginary, or, as he was taught to call it in the jargon of the wards, "functional." He often forgot the real meaning of "functional," which acquired the fixed epithet "only." Nowadays attention is turning more towards the diseases that are "only functional" and students are allowed to know that many genuine disorders leave no anatomical changes should death occur in their early stages. The stress is leaving morbid anatomy in favour of physiology, a knowledge of which is necessary not only for the diagnosis of disorders of function but for the proper interpretation of the symptoms of "organic" disease. It is to meet this new demand that such books as this were made. First published in 1937, "Best and Taylor," despite its great girth and price and the accident of war, has reached a third edition. Clear and comprehensive, it holds a just balance between pure and applied science. Any man who teaches the practice of medicine needs it at his elbow.

Minor Surgery

Editors: Sir HUMPHRY ROLLESTON, BT., MD CAMB., FRCP; ALAN MONCRIEFF, MD LOND., FRCP. (Eyre and Spottiswoode. Pp. 174. 16*s.*)

THE editors have made wide and wise choice of subject matter, this little book includes the special branches—eyes, ears and gynæcology—as well as general surgical procedures. The various articles have been reprinted and revised from the *Practitioner*. Several of the authors rightly maintain that minor operations demand no less skill than major operations, and their advice, gained from wide experience, informs the descriptions of the most elementary operation. Modern methods of treatment are fully described, and their advantages and disadvantages assessed. The book is quickly and easily read; practitioners in all branches would do well to read it.

THE LANCET

LONDON: SATURDAY, DECEMBER 4, 1943

THE NURSE IN CHARGE

DOCTORS at work are not often members or leaders of teams. In student days, the unit or firm of clerks or dressers, house officer, registrar and chief, does admittedly take some of the rough edges off our individuality. But though the chief may chasten those he loves, registrar and house-surgeon are usually sweet-tempered. And the team is temporary; students move on after three months, and even the stay of registrars is limited. Most doctors, then, never experience life in a rigid hierarchy from which there is no escape unless armed with a testimonial from the man on top. In other walks of life however the team is a common working unit, and its happiness and efficiency depend on the recognition that obligations are incurred by those invested with leadership. The Army officer who is worth his salt does not eat or sleep until he is satisfied about the comfort of his men. The superintendent of the telephone exchange must watch over the health and happiness of her girls with a quasi-maternal eye. And the factory welfare officer is a symbol of the recognition by the bosses that contented workers work best.

Nursing is as rigid a hierarchy as is to be found in democratic society. The conduct and behaviour of the nurse, at each stage of her career, is reported on by her superior, and on these reports the matron must base her assessment and her testimonial. Orders are issued from which there is no appeal. "Her's not to reason why" is still the general rather than the exceptional attitude forced on the probationer. As a result, girls with individuality and initiative tend not to find their way into nursing, while those who do so lose something in their passage through the mill. There are many sisters and matrons who retain their humanity in their journey to authority; but there are ot[illegible] hospita[illegible]ique a[illegible]t. A sister has two families to care fo[illegible] [illegible]ts and her nurses, not to mention her doctors, and the kindness lavished on the sick may leave little for the subordinate. Then, again, the charming manners which impress the lay committee are sometimes only one facet of a personality which seeks power by the easy road rather than lasting satisfaction by the hard path of service to all. At all events, there are few hospitals which cannot claim at least one sister whose ward is a byword.

One of the unhappy results of the exaggerated respect enjoyed by the nurse in charge is the fear which many junior nurses have about reporting sick. A feeling of malaise and fatigue, unaccompanied by a spectacular rise in temperature, is all too liable to be treated as a trifling disorder, unworthy of a nurse, and certainly unworthy of medical attention; yet it is precisely these symptoms which may be the earliest sign of tubercle. Moreover it is a short-sighted tradition, for patients no less than staff, which counts it creditable to carry on with a heavy cold. The problem is to know how the nurse in charge can be converted into someone who cares for her staff no less diligently than for her patients. There are hospitals where the nurse who does not eat her breakfast is forbidden to go on duty, and the one who looks seedy on duty is sent off again forthwith. But this is the exceptional viewpoint and a difficult one to maintain when patients must be nursed on a starvation ration of staff, and by a team in which the raw student nurse counts as a unit and not as a supernumerary. Present standards of hospital staffing, which work everybody to capacity all the time, and meet extra claims by achieving the impossible, need revising before a nurse can report sick without uneasiness. Probably there is no simple solution. Committees of junior nurses, staff nurses, and sisters, with power to make representation to hospital boards, are likely to infuse something of the new spirit that is needed. Careful psychiatric selection, both of probationers and sisters, would offer a second line of approach. A return of the married woman to nursing, not necessarily as a subordinate, but as a sister working regular daily hours and living out, might help to ventilate the cloistered atmosphere; and indeed the atmosphere itself might change if all qualified nurses had the option of living out. Finally, there is much to be said for a short course in staff management for all nurses who aspire to take charge of others. Then at least those who inspire fear because they do not know how to inspire respect will have the opportunity to dispel their ignorance.

NEUROSURGERY IN AFRICAN WARFARE

NAPOLEON was fond of saying, "Don't fight your enemy too long, he will begin to understand war." Last week at the Royal Society of Medicine Brigadier HUGH CAIRNS unfolded a remarkable story of the evolution of the neurosurgical services in response to the changing needs of mobile warfare. Considerable credit for such triumphs is due to the Army medical directorate for their vision and alert pliant control. At the beginning of this war it was realised that there was no place for the "gipsy" specialist roaming from hospital to hospital, and segregation of head injuries was decided on. The neurosurgeon insisted that he was but a poor thing unless equipped with his full armamentarium. He had to have a sucker, diathermy and adequate lighting, otherwise the surgery degenerated into a higgledy-piggledy affair. Special vehicles thus equipped were planned and constructed; but in France they were captured before their worth had been tested. ASCROFT,[1] fully equipped, was now sent to the Middle East. At first he worked in the forward areas, but he soon found that, owing to the difficulty of segregating casualties in the very forward areas, only 10% of those reaching him had head injuries. It was therefore decided to base the neurosurgical team behind the general hospital; this meant a delay in the primary operation of quite 48 hours, but even so the results appeared to make it well worth while for the patient to wait for such special services. Among ASCROFT's cases, the fatality-rate where the dura had not been pierced was 1·5%; where the dura had been pierced it was 15%. But a disquieting feature was that one out of four (75 out of 293) of the penetrating wounds developed brain abscess.

With the break-through at El Alamein the lines [illegible] communication became so long that K[illegible] who was now in charge, split his neurosurgical team and himself went forward. To the original team equipment he added an operating-theatre built within a captured Italian motor coach, as described in his posthumous paper on our opening page. It says much for the general medical organisation that EDEN was able to operate on 188 out of the 293 head injuries within 24 hours of injury, and that only in 34 were the wounds more than 3 days old. Primary healing was thus obtained in over 90% of cases. The lowered incidence of infection as a result of getting such cases early is well reflected in the fall of serious complications. CAIRNS gives 3·4% as the incidence of intracranial infection in EDEN's cases. In ASCROFT's "late" cases the case-mortality due to infection was 10·8%; in the last war CUSHING's case-mortality due to infection was 36·5% and death was then usually due to a rapid meningitis rather than to late abscess formation. This lowered incidence of sepsis, CAIRNS points out, is important not only from the point of view of immediate complications but because of its effect on the subsequent development of traumatic epilepsy. ASCROFT,[2] after a thorough study of Ministry of Pensions records of the last war, concluded that long-continued wound sepsis, whether the dura was preserved or penetrated, favoured, and was closely related to, the onset of traumatic epilepsy. It is an important fact, therefore, that EDEN obtained 97% primary healing in a series of 139 scalp wounds. EDEN found no place for first-aid operations, but there is probably a need to sterilise such external wound surfaces early; for CAIRNS brought bacteriological evidence to show that in most brain wounds infection starts in the superficial layers of muscles and then spreads inwards. *Staphylococcus aureus* was the predominating infecting organism, and sulphonamides alone will not control this, though it is reasonable to give them credit for the relative absence of streptococci. The Russians too, CAIRNS recalled, found their brain wounds infected—only 2 out of 300 were sterile. CAIRNS and others have used penicillin in wounds over 72 hours old, and the results were encouraging. Penicillin is the most powerful bacteriostatic agent that we have against the infecting *Staph. aureus*; very little is required in the head cases and it is hoped that it will soon be fully available. As FLOREY [3] has pointed out, its correct place is in the wound early, in the form of a penicillin and sulphonamide powder; a first-aid operation to get the penicillin into the very depths of the wound may become necessary. CAIRNS also reports that, contrary to Russian experience, clinical gas-gangrene of the brain has not been seen in the Middle East, though clostridia had been found disporting on the surface.

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[1] Ascroft, P. B. *Brit. Med. J.* 19[illegible]

The immediate postoperative mortality in the penetrating wounds reported by EDEN was 25 out of 102 cases; 18 out of the 25 died within 24 hours from the initial brain damage. Coma came to be regarded as a serious prognostic sign, and it is to be noted from his figures that of the patients who died half were in coma. A third of all the head injuries had other associated injuries, and coöperation with the general surgeon and ophthalmic surgeon was important. The orbital injury often had an associated brain lesion, and EDEN recommends suturing of the lids after removal of orbital contents. In the sinus-brain injury (with its grave risk of meningeal infection) he repaired the dural defect with a free fascia graft. This however usually necessitates an extensive operation, and CAIRNS reported that SCHORSTEIN (who was attached to the First Army) has obtained good results by packing with soft-paraffin gauze. The dura was not closed, which is rather different from the German practice [4] of cutting "postage stamps" from the external dural layer or turning in pericranial flaps to close the defect. Where the sagittal sinus had been injured EDEN was able to control the hæmorrhage by silk suture over muscle grafts; CAIRNS gave the very useful tip of raising the head (sitting the patient up). The neurosurgeons prefer sulphadiazine by mouth or its sodium salt intravenously. EDEN regularly dusted the brain with sulphathiazole, and CAIRNS reports that this was not followed by epileptiform seizures as described by WATT and ALEXANDER.[5] EDEN insists on full closure of the entire scalp wound, and makes use of extensive flap-sliding incisions. His cases were evacuated by air within 2–3 days and they all travelled well. With the poet the patient may well say "Now that the work is smoothly done, I can fly and I can run." All men with scalp wounds were back on duty in from 10 days to 3 weeks; the rest of the follow-up is not yet complete, but we learn from ASCROFT's figures that quite 70% of head wounds (516 cases) returned to full duty.

Will the few neurosurgeons at present available be able to deal with all the casualties expected in the future? The essential function of the neurospecialist, ASCROFT declares, is to deal with the difficult case. The technique of acute traumatic brain surgery is well within the competence of the general surgeon, and it is to be regretted that it is the fashion of the hour to make a scapegoat of him: no general surgeon would deliberately leave locks of hair, bricks and other debris within a wound. Neurosurgery, however, has developed a very specialised technique, and its thoroughness and leisureliness appear to the general surgeon somewhat pernickety; he does not see the need for all the fiddle-faddle. For answer the neurosurgeon can point to his own results. There is only one way to learn this techn[illegible]nd that is at the operating-table. It is to be hoped that the EMS and other Services will make such practical teaching possible.

CORONER AND DOCTOR

WE published last week a summary of an authoritative legal opinion on the important question of the possible obligation of medical practitioners to report to the coroner the death of a patient. That doubts should have existed is the natural result of the incredibly untidy condition of the law, whereof an optimistic maxim forbids us to plead ignorance. The layers of statutes governing the recording of births, deaths and marriages go back to 1836 and have long cried aloud for simplified restatement. It is not surprising that popular understanding should be tempted to confuse the registrar's duty to report certain deaths to the coroner with the practitioner's duty to certify the cause of death. It is reassuring that solid authority should confirm the statement, set out in 1927 in the *Conduct of Medical Practice*, that neither under the act of 1926 nor any other act is there any legal obligation upon the medical man to inform the coroner. The earliest operative words in the Coroners Act of 1887 are "When a coroner is informed"; the coroner is not put upon inquiry until he is informed of the death. The existence of a legal duty may be tested by the evidence of its enforcement. Is there any precedent for the prosecution of a practitioner for the supposed common-law misdemeanour of failing to report a death to the coroner?

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[2] *Lancet*, 1943, ii, 211.

[3] Florey, H. W. see *Lancet*, Nov. 20, 1943, p. 638.

[4] See Cairns, H. and Guttman, E. *Bull. War Med.* 1943, 9, 477.

[5] Watt, A. C. and Alexander, G. L. *Lancet*, 1942, i, 493.

Deaths in certain particular circumstances—e.g., in prisons, asylums or inebriate homes—cast a special statutory duty upon persons in charge. Otherwise it is clear that Parliament deliberately made notification the responsibility of the registrars of deaths. As is well known, the registration regulations of 1927 require the registrar to tell the coroner of the following deaths before registering them: those where the deceased was not attended by a registered medical practitioner during his last illness or where a duly completed medical certificate in the prescribed form is not forthcoming; those reasonably believed to be unnatural or due to accident, violence or neglect, or attended by suspicious circumstances, or due to some cause apparently unknown; those due to abortion and certain specified diseases, particularly various forms of poisoning; those occurring after "an operation necessitated by injury or occurring under an operation or before recovering from the effects of the anæsthetic"; those where the deceased was apparently not seen by the certifying doctor either after death or within 14 days beforehand; and lastly those alleged stillbirths where there is reason to think the child was born alive. Notification of the coroner in these instances does not, of course, mean that an inquest will inevitably follow.

Coroner and practitioner alike desire that all necessary inquiries should be undertaken and completed with the least possible discomfort to the public. The coroner may request, though he cannot require, that certain deaths (for example, those taking place in hospital within 24 hours of admission or within 24 hours of administration of an anæsthetic) be reported to him by the medical authorities; but he generally does this because he is aware that it is the relatives who suffer by uncertainty and delay. P [illegible] spare anxiety to th [illegible] latives are occasional [illegible] uption of their arrangements for the funeral. As was well stated in the letter published last week, medical practitioners (like other members of the community) have social, public and moral duties, not enforceable by law, to assist the coroner. In the past they have collaborated harmoniously for the public good. The very existence of the uncertainty lately emphasised is remarkable evidence of the reasonable spirit mutually displayed between the medical profession and that ancient office of coroner which the profession at large has as little desire as the rest of the community to see abolished.

MR. BASIL GRAVES will talk on the cult of the eye and the quest of reality at the Royal Eye Hospital Clinical Society on Friday, Dec. 17, at 4.30 P.M.

Annotations

CHEMOTHERAPY IN ACUTE OSTEOMYELITIS

SINCE sulphathiazole was introduced there have been a good many isolated case-records of acute hæmatogenous osteomyelitis treated with this drug, but until recently no adequate series has been published. To assess the effects of chemotherapy in osteomyelitis is difficult because there are generally two separate conditions to be considered—the staphylococcal septicæmia and the bony lesion. A drug may affect the one and not the other. Butler,[1] reviewing 500 cases untreated by chemotherapy, found a mortality of 25%. The cause of death was always staphylococcal septicæmia and the death-rate was uninfluenced by the type of operation; but of 31 cases in which no operation was performed, because the patient was considered too ill for it, 26 were fatal. To lower the mortality of this disease sulphathiazole must be able to deal with a severe blood infection. The severity of the infection, and the prognosis, can be judged on the results of repeated quantitative blood-cultures: Valentine and Butler[2] showed that of 17 patients whose colony counts rose to over 30 per c.cm. of blood only 3 lived; 5 of the 17 received sulphathiazole, but all died save one. Of 12 patients whose colony counts were under 20, all but 2 recovered, though only 2 had sulphathiazole. Similar figures are given by McLellan and Goldbloom.[3]

Robertson[4] now records 89 cases of acute hæmatogenous osteomyelitis with only 4 deaths. Blood-culture estimations are not given, so it is impossible to assess the severity of the infections, but the series provides one of the lowest death-rates yet recorded for the disease. Robertson believes that operation is hardly ever required and supports this claim with an account of 25 cases treated with sulphathiazole alone, despite the fact that some of them developed sinuses. He does not approve of immobilisation and uses no splinting of any kind save extension where the joint is infected. In his experience sulphathiazole given early in the disease and in adequate dosage (8–10 grammes daily) not only lowers the mortality, but also limits the bone infection. McKeown,[5] who has concentrated on the effects of sulphathiazole on the bone lesion, found in a small series of 25 cases that the best results came from adequate chemotherapy reinforced by drilling the infected bone. He maintains that with this treatment he was able to cut short the illness and to get a better final result than with cases untreated by chemotherapy. Like Robertson, he emphasises the necessity for using sulphathiazole soon. If it is given when infection is well established in the bone no clinical improvement can be expected.

DETENTION BARRACKS

AFTER the trial of two warrant officers for the manslaughter of Rifleman Clayton, the Prime Minister appointed Mr. Justice Oliver, the Bishop of Reading and Lord Moran, P.R.C.P., to inquire into the treatment of men under sentence in naval and military prisons and detention barracks. The committee, on which Dr. H. E. A. Boldero served instead of Lord Moran, have issued a frank and useful report which admits deficiencies, especially earlier in the war, but expresses the opinion that men in detention are not now exposed to calculated brutality. A certain amount of shouting, "chasing," and bad language is still encountered, and the committee discuss the awkward problem of finding the right kind of staff. The present medical arrangements on the whole impressed them very favourably. In some places separate accommodation for the mildly

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1. [illegible] 261.
2. [illegible] *Lancet*, 1943, [illegible]
3. [illegible] *rad. med.* [illegible]
5. [illegible]

ill is needed because they lie in their usual beds. It would also be best to have a whole-time medical officer for each detention barracks, but the shortage of doctors is an obstacle to this, and special aptitude for the work is important. The onus on the medical officer would be lightened "if days spent comfortably in hospital did not count towards the completion of the sentence." Changes of medical officer have sometimes been far too frequent, but "it would not be right to keep a young man at this work year after year." The committee's strongest criticism of military institutions is made against the sanitary arrangements at most of those they visited: the men may be locked in their sleeping rooms from 4 or 5 PM onwards with no sanitary facilities except buckets which cannot be flushed; and for prisoners in cells more latrine parades are needed. Their sharpest comment, however, is reserved for naval detention quarters, where "the discipline and general life of offenders are in many respects far harder even than in the military prisons." During his entire sentence the sailor has no communication at all with his fellows; for at least a fortnight he has to lie at night on bare boards without blankets (except in cold weather) and may neither send nor receive letters. In the Navy, moreover, little seems to be attempted towards occupying the men's minds and improving their characters while undergoing detention. In all the Army establishments there is at least one education room, and often an information room as well, with cuttings from the illustrated papers, war maps and so forth; the cinema and wireless are used for educational purposes, and commonly there are regular courses of lectures on current topics, with brains' trust meetings. Welfare services are also valuable, but tend to come too late. The committee remark that if the Adjutant-General's admirable notes on *The Soldier's Welfare* were fully carried into effect, particularly by company and platoon officers, perhaps as many as half those now under sentence would never have been committed to detention.

IMMUNITY TO TRICHINA

THERE has lately been a good deal of discussion on the stage of infestation with *Trichinella spiralis* at which immunity is developed by the infested person or animal. Is it during the phase when the adult trichinæ are harboured in the intestinal canal, or when the larvæ migrate throughout the body and encyst in the muscles? The work of Roth[1] seems to indicate that intestinal infestation alone may suffice to confer a persistent immunity of more or less pronounced degree to reinfestation. This he attained by feeding guineapigs with larvæ of one sex only, preventing therefore the reproduction of the adult worms and the dissemination of daughter larvæ into the guineapig's body. Guineapigs thus treated later survived a lethal dose of infective larvæ of both sexes and showed in the muscles considerably fewer encysted worms than the control animals. The differentiation of male and female larvæ[2] although rather difficult and tedious is quite feasible and apparently successful in most cases. Others[3] have shown that immunity can be acquired not only actively by means of a sublethal dose of the infesting agent but also by parenteral introduction of trichina antigen and by passive transfer of immune serum. Immune bodies produced by metazoa like trichina, as in the case of bacteria and protozoa, are associated with the globulin fractions of the serum.[4] An interesting feature noted in some of these investigations was the response occasionally arising in immunised animals after the reinfesting dose. This response appeared to be of an anaphylactic type with symptoms of "allergic enteritis," often terminating in the death of the animal. The hypersensitive immune response to the trichina substances has apparently been observed also in human beings.[5] This has to be borne in mind in view of the fact that a certain proportion of the population both here and in America are known to have suffered from subclinical infestation with *Trichinella spiralis*[6] and skin tests have shown[7] that they carry antibodies against trichina antigen.

EXPLAINING MENTAL ILLNESS

EVERY psychiatrist and indeed every doctor has to explain to relatives what mental illness and admission to a mental hospital really entails. It is a difficult task, but the rewards for executing it well are great. Often however those to whom the explanation and reassurance are addressed are too deeply stirred, or too much influenced by common prejudices about insanity, to be able to grasp what has been told them; often, too, the doctor lacks the time, and perhaps the skill, to allay all their fears and doubts. Mrs. Stern's book[8] will, to a great extent, fulfil the task for him. It is so arranged that the successive stages and problems which will confront relatives are dealt with seriatim. The first few chapters cover the attitude towards mental illnes the need for hospital treatment, desirability of a publi or a private hospital for the patient, procedure of a mission, getting the patient to the hospital, and the fir few weeks there. The latter part of the book describe life in the mental hospital and gives advice about letter visiting, parole, attitude after discharge from hospita and finally about the responsibility of all citizens for th mental health services in their community. Medic details are eschewed; there are no descriptions symptoms, helps to diagnosis, or names of disease Here and there differences of an unessential kind betwee American procedures and ours will occur to the Englis reader, but they do not reduce the great usefulnes which such a manual could have in modifying th attitude of the public in this country and lessening th avoidable misery incident to mental illness. Sensibl clear, unsentimental and humane, the book is a mode instrument of public health education. It would be very suitable use of the funds and influence of th National Council for Mental Hygiene if it could subsidis or otherwise promote the publication of the book here where it is at present virtually unprocurable.

SOCIAL REFORM IN CANADA

OUR Canadian correspondent last week referred t plans for social security in Canada. A committe appointed by the Canadian House of Commons has bee considering a general report on social security, prepared by Dr. L. C. Marsh, and a report on health insuranc containing the drafts of Dominion and provincial bill to establish universal health insurance and improved public health services.[9] The medical profession in Britain will be particularly interested in the parts of the scheme relating to medical and sickness benefit. For the extension of medical services the Canadian planners rely chiefly on the insurance principle and insurance machinery. Health insurance, including medical benefit, will be mainly self-supporting. All insured persons and their dependent children will be entitled to medical, surgical and maternity benefits, dental benefit, pharmaceutical benefit, hospital benefit and nursing benefit; these are expected to include adequate measures for the prevention of disease and all necessary diagnostic and curative procedures. The scheme also embodies important measures of occupational readjustment—

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1. Roth, H. *Amer. J. Hyg.* 1943, 38, 99.
2. Bugge, G. *Arch. wiss. prakt. Tierheilk.* 1934, 68, 24.
   Culbertson, J. T. *J. Parasit.* 1942, 28, 197.
   , E. A. *Amer. J. Hyg.* 1941, 34, 73.
5. Bercovitz, Z. cited by Culbertson.
6. Mcleney, H. E. *Amer. J. Hyg.* 1941, 34, 18.
7. Shapiro, M. M., Crosby, B. L. and Sickler, M. M. *J. Lab. clin. Med.* 1938, 23, 681.
8. Mental Illness: A Guide for the Family. Edith M. Stern. Oxford University Press. Pp. 134. 6*s*.
9. Summarised in Social Security Planning in Canada, International Labour Office, Montreal, 1943 (obtainable from the branch office of the ILO: 38, Parliament Street, London, S.W.1).

Special Articles

GENERAL MEDICAL COUNCIL

WINTER SESSION, NOV. 23–25, 1943

THE following names were restored to the Medical Register after penal erasure: Christopher Bastible, Dominic Francis Curran, Richard Christopher Howard, Arthur John Ireland, Charles Liddell McHarg, Antony Alexander Martin and George Anderson Mitchell. The names of John Donaldson and Edwin Spencer Tebbutt were restored to the Dentists Register.

Charges against Practitioners

The council, after considering reports from the Dental Board, directed the registrar to erase the following names from the Dentists Register: *Cyril Walter Bairstow*, registered as of 13, Hoe Street, Walthamstow, London, E.17, Dentists Act, 1921; and *Thomas Gordon*, registered as of 60, Otago Street, Hillhead, Glasgow, Dentists Act, 1921. Mr. Bairstow had been found guilty by the Dental Board of wrongfully obtaining money by untrue dental letters; and Mr. Gordon had been convicted of theft at Clerkenwell police-court.

PROFESSIONAL RELATIONSHIP NOT PROVED

The case of *Joshua Posner*, registered as of 261, Hyde Park Road, Leeds, LRCPI (1919), summoned on the charge of committing adultery with Phyllis McNulty, a married woman, with whom and/or her husband he had stood at all material times in professional relationship, and of thus being guilty of infamous conduct in a professional respect. Dr. Posner appeared, accompanied by Mr. Oswald Hempson, solicitor, who admitted the adultery but put the professional relationship in issue.

Mr. Winterbotham, the council's solicitor, prosecuting, read from the transcript of the evidence of Mr. B. G. McNulty, the husband, given before the Divorce Court. This showed that the couple had been married in 1933 and had been happy until the beginning of the war. Mrs. McNulty had been a beauty specialist representing a London firm in Leeds, and making more money than he made. In 1938 he had taken out an endowment policy and Dr. Posner had examined him on behalf of the insurance company. Later, the doctor had treated him for a football injury, and had become a friend of the family. He was sure that Dr. Posner had attended his wife professionally. When he was home on short leave in October, 1939, his wife had been complaining of illness and anæmia and the doctor had said it was quite possible that she would need an operation, and asked him for authority to have the operation performed. It had been performed, and he had been told of it two days afterwards. The doctor had seen her in the nursing-home as her medical adviser.

A statutory declaration by the secretary of the nursing-home was put in, deposing that the wife had been admitted for operation on Nov. 3, 1939, under Mr. B. L. Jeaffreson, the gynæcologist, coupled with the name of Dr. Posner. She had assumed that Dr. Posner was the general practitioner referring the case. The nursing-home register showed his name in that capacity.

Dr. Posner, giving evidence, said he was a temporary flight-lieutenant in the RAF. He was married, but had not cohabited with his wife for well over 15 years, and she was now in America with their children. He had first met Mrs. McNulty about Christmas, 1934, and had known her as Miss Cutler. He had not discovered until 1937 that she was married, and before that time they had become close friends and then lovers. He had first come in contact with her husband when in 1938 he had examined him for life insurance without realising his identity. He had only known him for her husband when, at the end of 1938, he had been sent for by telephone to Mrs. McNulty's flat to treat him for a football injury. He had gone unwillingly and strapped the knee; had seen him twice afterwards, and had made no charge. Since then he had discovered the relations that existed between Mrs. McNulty and her husband. He never saw her in her house alone but studiously avoided doing so. Her husband kept on ringing him up and asking him to go out, and he had been out with the couple together, though he had never sought such a friendship. His own wife, who ha[illegible] of the association with Mrs. McNulty, had always refused to go with them. The first time the husband had raised any question about the association between his wife and the doctor had been on an occasion in 1939 when he had seen them embrace in the hall. The next day they had discussed the situation and the doctor had told him that they were prepared to marry. The husband did not appear to be angry. The doctor had played no professional part in Mrs. McNulty's operation but had merely engaged the specialist and paid his full fees and those of the nursing-home. He had not been present at the initial consultation, and had visited the wife in the home as an ordinary visitor in visiting hours. He had been present at the operation, but only as a spectator.

Mrs. Phyllis McNulty gave evidence confirming Dr. Posner's. She said she had been married in 1933, had never been happy with her husband, and had left him in 1934, intending that the separation should be permanent. They were entirely unsuited to one another. They had never cohabited since then, but he had occasionally slept in another room at her flat. She had been universally known by her maiden name of Cutler. She had been earning £10 or £12 a week, her husband only a few pounds as a travelling salesman. Dr. Posner had never attended her professionally, and on one occasion during their relationship (apart from the operation), when she had needed a doctor she had called in another. When the damages were agreed at £500 the husband had accepted a condition that no mention should be made during the proceedings of the fact that the correspondent was a doctor. She was very surprised when her husband had broken this condition. He had remarried almost immediately after the decree absolute.

Mrs. Spencer, Mrs. McNulty's mother, also gave evidence; and Mr. Hempson read a statement from Mr. Bryan Leslie Jeaffreson saying that Dr. Posner had made an appointment for him to see Mrs. McNulty but had taken no active part in the arrangements for her treatment, and had refused to give the anæsthetic, saying that he was not in any way her doctor. Mr. Jeaffreson also deposed that he had given all the after-treatment and had never seen Dr. Posner present at the home in any medical capacity.

The council, after short deliberation, announced that professional relationship had not been proved.

IMPROPER CERTIFICATION

The case of *James Brierley*, registered as of 229, Boundary Street, Liverpool, LMSSA (1908), summoned to appear on the following charge:

> That you were on May 24, 1943, convicted, after having pleaded guilty, at the Liverpool City Police Court of the following misdemeanours—viz, (1) Of unlawfully issuing a medical certificate to Stanley Kane having reasonable cause to believe that it was likely to mislead officers of the Fire Guard organisation in the discharge of their lawful functions in connexion with the defence of the realm or the securing of public safety (date of offence March 26, 1943), and were fined £15; (2) the like (date of offence April 1, 1943), and were fined £15.

The respondent was not present, but was represented by Mr. Oswald Hempson, solicitor.

Mr. Winterbotham, laying the facts before the council, proved the convictions and read extracts from the evidence given at the trial. When interviewed by the police, the respondent, it was said, had shown signs of incipient senile decay; his clothing had been dirty and he had broken down and wept. In his own reply the respondent said that he had *often* been asked for certificates but had never issued an untrue certificate and had always avoided exaggeration. He invariably saw the patient at the time or shortly before, and examined at least the eyes, tongue and pulse. His difficulty was the absence of a fixed standard. He used the qualification "I am informed" because he could not trust the veracity of the patient.

Mr. Hempson said Dr. Brierley was an old and sick man. Two proposed charges had been dropped because he had clearly been blameless; those on which he stood convicted had arisen out of action inspired by the police. He had ample private means and lived and practised of his own choice in the slums of Liverpool, where he had devoted the last eighteen years to treating the poor. He had worked throughout the whole of the heavy bombardment, assisting the wounded and homeless. His life had been without blemish. Mr. Hempson put in many testimonials to his outstanding character and services.

The President announced that the council took a grave view of culpable laxity in certification, which injured the recipient and others, including the state, and also the good repute of the profession. They had decided, in view of the circumstances in which the false certificates were given, to postpone judgment for twelve months, subject to the usual conditions that the offence should not be repeated and certificates of good conduct should be submitted before the adjourned hearing.

ERASURES FOLLOWING CONVICTION

The council directed the erasure of the names of three practitioners who had been convicted at assizes of procuring miscarriage. They were:

Richard Murray Barrow, registered as of Mansion House, Stone, Staffs, MB Durh. (1911), summoned to appear on the following charge:

[illegible]

Alfred William Bevis, registered as of 15, Monks Road, Lincoln, MRCS (1909), summoned to appear on the following charge:

That [illegible] 1943, [illegible] namely [illegible] means [illegible] Louise [illegible]

William Goodacre Roberts, registered as of 29A, Islington, Liverpool, MRCS (1921), summoned to appear on the following charge:

[illegible]

The council also directed the erasure of the name of *Humphrey Manley Hamilton Ashwin*, registered as of 21, Wilton Street, London, S.W.1, MRCS (1925), summoned to appear as a result of conviction at the Horncastle petty session, Sept. 20, 1943, of embezzlement of four sums from his employers, and, further, of conviction at a general court-martial in April, 1942, at Cardiff of conduct to the breach of good order and military discipline in ten cases—in five other cases of behaving in a scandalous manner, and of offering fifteen cheques, failing without reasonable excuse either to ensure that he had sufficient funds in the hands of the bank to meet the said cheques when presented, or to make arrangements for the said cheques to be honoured when presented.

The council also considered several charges arising out of convictions for drunkenness, but did not direct any erasures.

ERASURE UNDER SECTION 26

The council, in pursuance of section 26 of the Medical [illegible]

The Pharmacopœia

[illegible] that the number [illegible] 1932, sold up to [illegible] s of the sixth Addendum [illegible] copies have already [illegible] enting [illegible] larger [illegible] ndum [illegible] ss has been made in the [illegible] xt complete Pharmacopœia [illegible] ittee was appointed to [illegible] copœia Commission on [illegible]

[illegible] in manufacture."

MEDICINE AND THE LAW

The Goldschmidt Prosecution

MEMBERS of the House of Commons were not slow to question the Home Office representative about the magistrate's condemnation of the police for the use of *agents provocateurs* in the unsuccessful attempt to obtain a conviction against Dr. Goldschmidt for false certification. The official reply claimed that the action was within the permissible limits laid down in 1929 by the Royal Commission on Police Powers and Duties. The commission's report, it was contended, recognised that in certain types of case the police could not enforce the law without adopting the methods used; a distinction was drawn between incitement to commit an offence and "the employment of subterfuges in order to obtain evidence where habitual offences are reasonably suspected and there are no other means available to the police of procuring the necessary evidence." Is there not a risk that this public statement will make things worse instead of better? It implies that the use of the challenged methods is not merely tolerated to help the police out of difficulties inherent in the law (almost as if convictions were more important than fairplay) but also that their use will consciously convey to the tribunal at trial the information (in fragrant defiance of the accepted principles of British justice) that the accused is believed to be a habitual criminal. The official spokesman told the House of Commons that "the police would not countenance the employment of *agents provocateurs*." The police serjeant concerned in the prosecution on [illegible] *reconcile these opinions; the magistrate's observations* are on record and will be noted in the proper quarter. What we are bound to emphasise is the intense resentment felt that it should be thought necessary, in the words *of Dr. Haden Guest's question, "to employ these* Gestapo methods against anyone in the medical profession." Did not the authorities know, he asked, that it was possible to find out what a doctor was doing otherwise than by this unfortunate procedure?

The 1929 commission, set up after an incident in Hyde Park, took note of the allegation that the police were occasionally used as *agents provocateurs*, arising probably from the methods they were found to adopt to obtain evidence in certain types of case. "The use of a foreign phrase for which there is no exact English equivalent," said the report, "indicates that the practice *is regarded as alien to our habits and traditions*: we assume that an *agent provocateur* may be taken to mean a person who entices another to commit an express breach of the law which he would not otherwise have committed, and then proceeds or informs against him in respect of such offence." The commission found two schools of thought, police opinion itself being divided. One school held that the [illegible] to observation only and [illegible] offence. The other held [illegible] in offences but "should [illegible] The report commented that neither school countenanced "*the practice of initiating offences with a view to enticing or entrapping members of the public into committing breaches of the law.*" The Royal Commis- [illegible] mitted.

Prof. T. P. McMURRAY will open a discussion on the late problems of war surgery at 2.30 PM on Dec. 16, at the Ministry of Pensions Hospital, [illegible] Road, Liverpool 16.

In England Now

A Running Commentary by Peripatetic Correspondents

WE have two patients in the ward. One looks like the Devil, the other like St. Augustine. The devil has diabetes, but St. Augustine has tabes.

A bad thing has happened. We had a criminal in the ward, and he escaped. He was in the hands of the police, and for a long while they guarded him rigorously, unaffected by his worry at having had a hæmatemesis. (He had it in jug; the policeman saw it.) But on the fatal day Sister had already realised that the guard was a weakling. The previous ones had never left his side; they had bladders as big as themselves. This one went so far as to talk to the other patients. Naturally he weakened towards the middle of the afternoon and went into the annexe to see a dog about a tree. The criminal jumped out of bed, dressed, waved goodbye to a cardiac failure and an active tubercle ("So long, boys," he said, "Best of luck.") and that was all that was seen of him. If anybody has a patient wearing a white shirt and grey trousers and passing a melæna stool, will they please ring Whitehall 1212?

* * *

For fifteen years, they say, not a single doctor has sat through a session of the General Medical Council as a spectator. Why should he? I dunno. But there are plenty of empty seats in the public gallery for anyone thinking of conducting his own defence some day. There are, in fact, two galleries, one at either end of the oblong court, a bright airy room, newly white painted since the blitz that damaged the building severely, and decorated with youthful embossed figures; even a cheerful room, with cheerful open fires to keep it cozy in winter, though there is nothing cheerful about the proceedings. The officials of the council—the president, with on his right the legal assessor, and on his left the registrar, chairman of business and treasurer—sit on a raised dais, with their backs to the great windows looking out on Hallam Street below. The floor of the court is divided in two by the solicitors' table, where sit the counsel, solicitor and solicitor's clerk for the respondent on one side and those for the council on the other. The council proper occupy six rows of leather-backed chairs, six or so councillors to a row, facing the solicitors' table, which splits them accurately in two. Each councillor has his desk, complete with bookcase full of tomes of reference and covered with papers. The witnesses have their box at one end of the high table, and the clerks take it all down under the president's eye. Lastly, there is the respondent himself, the cause of all this bother. His little box, with its chair, is squeezed against the wall at the end of the solicitors' table, so that he faces the president across a field of green baize and can mesmerise himself by staring at the glittering mace lying where president or clerk can seize it up if a councillor runs amok. From the public gallery the drowsy spectator sees the court as a suburban back-garden, with a wee oblong lawn in the middle, evenly spaced geraniums all round—the Medical Registers glowing before every councillor—a glistening patch of marigolds where the mace lies on the right, and a tiny speck of blue hyacinth on the left where over the respondent's head hangs a plaque of Hygeia.

* * *

One of the others has skidded on a steep hill and finished up under her cycle with a cut thumb and a grazed shoulder. A country doctor whom I rang up about some antitetanic serum told me, "I don't keep it; I always run into B for some when I want it." But B was the wrong way for us. W, however, was only a few miles off our route, so leaving the others I rode there, picked up from the W General Hospital the 3000 units the HS promised me over the phone, and we re-gathered at that night's stopping place for supper. It was already half-past nine and getting dark when the two of us set out to find the nearest doctor. The landlady had told us he lived at A, which was four miles away—"On the right, just past the market square; Dr. S is his name." It was a fine, starry night and we found his house without much difficulty. Mrs. S (so we learned later) opening the door to us; but having heard my request she said she [illegible]y sorry but it was Dr. S's half-day and he [illegible] expected back before midnight.

There was an isolation hospital at A, where I thought night-sister would surely give the serum if asked; and Mrs. S directed us. "Go back, and where the road gets very narrow there's a gate on the left. That takes you to the back of the fever hospital. It's before you come out on the main B road. You can't miss it." When we came out on the main B road it was obvious we must try again, and this time, by groping in the hedge with a cycle lamp, we found a small white gate. A steep and cabbagy earth path led us to the back of the fever hospital and we stumbled round to the main entrance. There was a clock ticking in the silence, a dim light and a vague hospital smell; and after we had clattered about a bit there appeared through a door on the right a figure in blue uniform whose changeless expression spoke of years of isolation. She said nothing, so I asked if I might speak to the night-sister. "I am the day-sister," she replied unexpectedly, "and the night-sister too," she added. "My friend fell off her bike," I explained, "and needs some ATS. I fetched some from W this afternoon. We tried Dr. S but he is out. Would you mind giving it?" "But I couldn't give an injection, not without doctor's orders" she said. "Who is the doctor?" I asked. "Dr. S," she replied. "This is a fever hospital, you see; suppose the patient got an infection, there might be a complaint against the hospital." "But your syringes are quite sterile, I'm sure; may I give the injection? I am a doctor." "Oh, but I can't lend hospital property," she answered, "Mrs. S rang up to say you were coming, and as Dr. S happened to ring up to ask if anything had come in I told him and he said on no account must I give the injection." This gave me an idea. "If I might find out on the phone from Mrs. S where Dr. S is I could explain it all to him," I suggested. She felt cornered, evidently, and without a word went through the door on the right. In a few moments she returned. "The matron says she is sorry but we can't do anything for you," she announced. "Might I, perhaps, speak to the matron myself?" I asked. "The matron," she replied severely, "is in bed."

There was still the district nurse, and we found her house a few miles off with the help of a notice in a village shop window, and a man who showed us the way, riding between us as he had no lights. The village was silent; it was 11.15 when we knocked at the door. At last a short figure in curlers and a dressing-gown, holding a lighted candle, drew the bolts and opened the door to us. She listened to my story. "Well, my dear," she said, "doesn't that mean an injection? It might be dangerous, mightn't it?" I explained that it is often done, and is quite harmless. "But I couldn't do it without doctor's orders," she said. I offered to write a prescription. "But I mean our own doctor," she replied, "Dr. S of A." "Well," I suggested, "I'll tell you what; if you will lend me your syringe, I'll give the injection." "But my dear," she gasped, "I haven't got a syringe."

We gave it up. Next morning we passed through H and had the ATS given in the casualty department of the H Memorial Hospital.

* * *

"What is a mouldy cold, Daddy?" The Professor laid down the *Lancet* he was reading and looked at the ten-year-old with interest. "Who called it a mouldy cold?" he asked. "Wel-l-l, cook said this morning that she had a re-el mouldy cold coming." Later that week: "Gentlemen, I assume you have seen the *Lancet* this week. I have no doubt you have read the articles on patulin, a derivative from moulds, and a substance of therapeutic promise in the treatment of colds. The published results indicate that not all the common colds will yield to patulin—they are too motley a crowd for that! But some will, and some won't. Those that are most likely to be cured are the re-el mouldy colds—ahem!—I mean . . ."

* * *

"Of course you know, Doctor," said little Roy's father, "he was a forced conception." I looked at little Roy, from whom we had removed a dermoid of the testis. Social Medicine—ætiology of teratomas—was I on the verge of a new realm in oncology? In spite of the flight of ideas, I hoped my face remained as untroubled by this remark as the dirty, contented sweet-sucking Roy. "How," I asked, "did that come about?" Roy's father exhaled some more beer. "They had to use chloroform, Doctor," he said impressively, "and instruments."

Parliament

ON THE FLOOR OF THE HOUSE

MEDICUS MP

THE eighth session of the present Parliament, the thirty-seventh of the United Kingdom of Great Britain and Northern Ireland, has come to an end. It began on Nov. 11, 1942, and was prorogued a few days over a year later. The King's speech on the prorogation reviewed the Moscow conference and drew attention to the part played by the Chinese government. The speech says that the U-boat attack is "largely broken," that in the Mediterranean "resounding victories have been won," rejoices in "the increasing successes of the armies of our heroic Russian Allies," and pays tribute to the courage and determination of our merchant seamen. The year's record on the field of battle is inspiring, but the King's speech at the opening of the new session, while affirming that the prosecution of the war will be the first task of the coming year, also outlines big plans for the future. In the next few months we are promised provisional plans for the period [illegible] to peace. Some of them, [illegible] relief work in Europe, are [illegible] the end of the war in Europe will, probably, leave us still at war against Japan. Thus we face a future in which the perspective of war changes but in which war is still the master of the world, harnessing men's energies in its service. But the King's speech looks beyond "the transitional period." There is to be an education act on the lines of the white-paper. There is to be provision for the training and employment of disabled persons, and the law governing the reinstatement of men and women discharged from the Services is to be amended. Legislation is to be passed giving powers for the redevelopment of areas which, because of bombing, overcrowding "or otherwise," need replanning.

The speech has not been too well received. It is stated in one paragraph that the primary aim of the Government is to provide "food, homes and employment." But the administrative plans on the legislation required to give them effect are not indicated. The question is asked how the distressed areas which existed before the war will be dealt with. What will happen in a mining area where mines have been permanently closed and whose [illegible] A. Brabner of the Fleet Air Arm, who moved the address in reply to the King's speech, put this clearly. "If young men make war, I hope they are entitled to some attention in the peace," a point with which the very large number of young medical men and women serving in the forces would proba[illegible] the miner MP, seconded [illegible] dubbed the new session "[illegible] it had to mix the facts of [illegible]

The Prime Minister h[illegible] war prospect ahead may be one of severe trial and great casualties. There may be political casualties too. On the last day of the old session a storm blew up over the release from detention, subject to special restrictions, of Sir Oswald and Lady Mosley. Sir Oswald is released on medical grounds—viz., "thrombophlebitis." It was pointed out in a question that the medical, nursing and hospital facilities [illegible] food and [illegible] four-room [illegible] detainees [illegible] no longer [illegible] opinion? [illegible] storm of anger swept over the country, and there have been protests from Australia and Canada. Because of this a debate has been arranged in which MPs will have the opportunity of criticism and the Minister an opportunity of justification. Some MPs who have always disliked the powers for detention conferred on the Home Secretary by regulation 18B are putting down a motion asking for the release of all internees. So the debate will be lively.

QUESTION TIME

Medical Reasons for Mosley's Release

Dr. HADEN GUEST asked the Home Secretary why, as the medical and nursing services provided in Holloway prison were adequate for prisoners there confined, supplemented where necessary by arrangements for operation or other treatment in London hospitals, it was necessary, for medical reasons, [illegible] and Lady Mosley from detention [illegible]

Mr. H[illegible] of a statement on the reasons for Sir Oswald Mosley's release, said: From time to time representations have been made to me as to the state of his health, and it accordingly became the duty of the prison medical authorities to advise me as to the nature and degree of the risk to his health which his continued detention would involve. For this purpose it was arranged that there should be consultation between the prison medical authorities and Lord Dawson of Penn and Dr. Geoffrey Evans. A consultation accordingly took place between the medical commissioner of prisons, two prison doctors and those two medical practitioners. The opinion of these five doctors was unanimous: it was that if the patient remained under the conditions which are inseparable from detention there would be substantial risk of the thrombophlebitis from which he is suffering extending, and thus producing permanent damage to health and even danger to life. This complaint is of long standing, and the question was not whether the appropriate medical treatment could be given in a prison establishment, but whether there was a [illegible] place of detention. The opinion of all these medical men was that, if the matter were considered purely on medical grounds, release from detention was essential for the purpose of checking the extension of his complaint and providing [illegible] of detaining this suspect to the permanent damage of his health and possibly to the danger of his life. On this point I can only say that, while considerations of national security must [illegible] to [illegible] except insofar as [illegible] While it is right [illegible] considerations, [illegible] is a risk of per[illegible] considerations cannot be paramount. They must be subordinate to considerations of national security. My justification for taking on medical grounds a course which would not otherwise have been tak[illegible]

I have authorised [illegible] in the belief that in present [illegible] can be maintained over him by the restrictions which I have imposed. But let there be no misunderstanding. If for any reason, whether because of evasion of any restrictions imposed on him or because of any change in the situation, it became necessary, on grounds of public security, to bring him back to detention, medical considerations would not be an obstacle to the course dictated by the national interests.

Commander O. S. LOCKER-LAMPSON: Will the Minister allow five doctors from this House to examine Sir Oswald Mosley?—But Mr. MORRISON declined to answer the question.

Sir ALFRED BEIT: Is it not a fact that phlebitis in its various forms needs absolute quiet and rest; and how can it be said that a person suffering from illness must have greater freedom of [illegible] opportunities for exercise? [illegible] r, but I understood that it [illegible] vigorous exercise. But it is not for me to [illegible] either [illegible] take t[illegible] not tel[illegible] I did not feel that I could do that.

Replying to Mr. SHINWELL, Mr. ATTLEE said that if there was a general desire in the House for a debate on this matter time could be provided.

Alleged Gestapo Methods against a Doctor

Sir Herbert Williams asked the Home Secretary what steps he proposed to take to prevent the police acting in future as agents-provocateurs, as they did in the case against Dr. Goldschmidt, which was heard at the North London Police-court on Nov. 16.—Mr. O. Peake replied: The limits within which the police are justified in giving opportunities to a person to commit an offence in order to obtain evidence against him are set out in the report of the Royal Commission on Police Powers and Duties, which recognised that there are certain types of case in which it would be impossible for the police to carry out their duty of enforcing the law without the adoption of such methods. The police are, however, well aware that the courts will always scrutinise most narrowly the evidence of any witness who can be represented as having encouraged or procured an offence which would not otherwise have been committed, and no action on the part of the Home Secretary is required to remind the police of the great care which must be taken in cases of this kind. I am not aware of anything in the case which need cause anxiety to a doctor who accepts in good faith a statement made to him by one of his patients.—Sir H. Williams: In this case were not three men encouraged by the police to go to a doctor and make a statement which they and the police knew to be false? Is not this a most undesirable procedure?—Mr. Peake: I think that there is a clear distinction which is well understood by the police between incitement to commit an offence which is wholly wrong and which is a disciplinary offence and the employment of subterfuges in order to obtain evidence where habitual offences are reasonably suspected and there are no other means available to the police of procuring the necessary evidence.—Sir H. Williams: Does the Minister think that the action of the police in this case was justified?—Mr. Peake: We have noted the view of the learned magistrate, and any necessary action will be taken.

Dr. Haden Guest: Does the Minister really think it is necessary to employ these offensive Gestapo methods against anyone in the medical profession? Does he not know that it is intensely resented that this should be done and that it is possible to find out what a doctor is doing otherwise than by this procedure?—Sir Archibald Southby: Has the Minister's attention been called to the remarks of the learned magistrate who tried the case, and does he not think it most unfair to the police themselves that they should have to take this kind of action?—Mr. Peake repeated that note had been taken of the remarks of the magistrate and any necessary action would be taken, and replying to a further question said the police would not countenance the employment of agents-provocateurs. This was not a case where there had been incitement to commit an offence.

Responsibility for Postwar Housing

The primary responsibility will continue to rest with the Minister of Health and the Secretary of State for Scotland, the Ministry of Works giving to these departments technical advice on design, methods of construction and building materials. The proposals for a postwar housing programme must, of course, be coordinated with the rest of the Government's plans for reconstruction in the years immediately following the end of the war, and this will be one of the duties of the Minister of Reconstruction. (Mr. C. Attlee replying to Sir Irving Albery.)

Pregnant Women in War Industry

Inquiries have been instituted by the Government through a number of sources to ascertain the extent to which women engaged in industry do in fact remain at work to a late stage in pregnancy or return to work too soon after childbirth. It is anticipated that these inquiries will be completed in time to enable a full statement to be made as to the information obtained and the Government's decision early in the new year. (Mr. Attlee replying to Mr. W. Brown.)

Milk for Expectant Mothers

In answer to a question Mr. W. Mabane stated: The position of expectant mothers residing in premises licensed as catering establishments has recently been re-examined and it is hoped shortly to introduce arrangements to enable eligible beneficiaries living in such establishments to obtain the financial benefits of the National Milk Scheme.

Increased Number of Old People

Replying to a question Mr. H. U. Willink, Minister of [illegible]: The increases in the number of men over 65 were, during each of the past two years, estimated at about 50,000 and 60,000 respectively. These figures represent an average percentage increase of about 30% per annum. Comparable figures for women over 60 were about 93,000 and 102,000 and 2·9% respectively.

Medical Conditions of Repatriated Prisoners

Mr. Rhys Davies asked the Secretary of State for War whether all the men recently repatriated from German prisoner of war camps were to be allowed their discharge from HM forces.—Sir James Grigg replied: It is likely that most of those repatriated, after examination by a mixed medical commission, will be discharged from the Army. Those who are found to be fit for further military service of the kind permitted by the Geneva Convention will be retained.—Mr. Davies: Are we to understand that these men, who have suffered so much, will not be entitled to their discharge if the War Office decides to retain them?—Sir J. Grigg: If their medical condition justifies it, they will be discharged, and most of them will be. Those who are fit will be retained for such service as the Geneva Convention permits.—Mr. Davies: Were they not repatriated because they were wounded, and too sick to be in the Army?—Sir J. Grigg: Some have improved in condition after being repatriated; but the majority will be discharged.

Medical Policy Association

Dr. H. B. Morgan asked the Home Secretary whether his attention had been called to the anti-semitic propaganda carried on by the Medical Policy Association, London; and whether, in view of their effect on the war effort of this country, he had considered the desirability of a prosecution.—Mr. Morrison replied: I have seen the first bulletin issued by this association. This document appears to introduce, quite gratuitously, certain arguments which may be regarded as having an anti-semitic bias, but it affords no ground for prosecution, or for any other action on my part.

Dr. Morgan asked the Postmaster-General whether he was aware that Dr. Basil Steele, of Regent's Park, employed by the Post Office on medical duties, was the secretary of an anti-semitic organisation known as the Medical Policy Association; that Dr. Russell V. Steele, practising at the same address, was a local post-office medical officer, whose duties involved attendance on a capitation agreement to postal employees in his district; and whether, in view of the anti-semitic views of these two doctors, he would consider allowing Jewish post-office employees to make alternative medical arrangements.—Captain H. F. C. Crookshank replied: Dr. Basil Steele is not employed by the Post Office, but assists his brother, Dr. Russell V. Steele, a general practitioner who has been a local post-office medical officer for nearly twenty years. I have no reason to think that Dr. Russell V. Steele allows whatever political views he may hold to interfere with the proper discharge of his professional duties, and I am not prepared to limit his post-office duties in the manner suggested.

HOSPITAL OFFICERS FOR THE SERVICES

The Medical Personnel (Priority) Committee has told the Minister of Health that unless special measures are taken the number of doctors entering the Forces will fall substantially short of the total required for the year. The need of the Forces is immediate and recruitment must be speeded up. The committee's view, in which the Minister concurs, is that the method likely to operate with least detriment to the civil population is to make a special call on men holding A and B2 posts in hospitals other than mental hospitals. Accordingly all men liable for military service who on Dec. 1 have completed three months in such posts will be called up immediately. No hospital may raise objection unless more than half the holders of its A and B2 posts (including women and alien practitioners) receive calling-up notices, in which case it should immediately send the Central Medical War Committee the names of those who should *not* be recruited in order that half may remain. The practitioners summoned retain their right of appeal on grounds of hardship or conscience.

The late Dr. W. L. Pryce Bevan, of Alton, Hants, left the residue of his estate, which will probably amount to £22,000, to the University of Edinburgh.

Letters to the Editor

AGENTS PROVOCATEURS

SIR,—The case briefly recorded in your last issue must be of interest to every medical man in the country. The evidence disclosed that three agents-provocateurs consulted a medical practitioner at the instigation of New Scotland Yard, and after giving a false name in one case, and false addresses and false medical histories in all cases, obtained certificates that they were unfit for work. The three men were subsequently examined by the police surgeon, and found to be fit for work. The practitioner was arrested [illegible] fence [illegible] police [illegible] that [illegible] the false information, and to feign sickness, and that he had also told them what to [illegible] admitted by the legal [illegible] Public Prosecutions. [illegible] were dismissed, and costs of ten guineas awarded against the prosecution.

The *Times* of Nov. 17 summarised the magistrate's comments as follows :—

"The police officer himself has agreed that the three men who went to the doctor were agents provocateurs. Not only ought such methods not to be encouraged, but let me say for my own part that I hope no such cases, where such methods are employed, will be brought into this Court. The facts in [illegible] *admitted that the stories they put up to the doctor were* wholly untrue. That kind of thing was wrong. The very basis of the relations between doctor and patient was honesty. In his view, the doctor had reasonable cause to believe that these three certificates which he gave could be given in good faith, because of the stories which were told to him by the men."

The importance and implications of this case should not be lost sight of by the profession, and it is to be hoped that the strongest possible protest will be sent by the various professional bodies to the Home Secretary and also to the Minister of Health. At the same time the thanks of the profession are due to the magistrate for [illegible] of the disreputable police methods [illegible] symptoms is so essential for accurate diagnosis that except in gross or advanced disease, or in the case of [illegible] the doctor is bound to accept it as [illegible] of disease, and a consideration of the patient's temperament and work. And even with the best will in the world there will on occasions be differences of opinion as to whether a patient is, or is not, fit for work. But what is the hard-pressed doctor to do when confronted with a patient who may after all be a police decoy acting under instruction, and whose story is a tissue of lies from beginning to end? The simulation of symptoms may be easy and the simulation of signs may not be difficult to those who have been carefully coached. And so the unwary doctor acting in good faith may become the victim of a police conspiracy.

The activities of agents-provocateurs are better known on the Continent than they are here. But even in this country these agents have been employed both by the Government and by the police for a hundred years or more, and under war conditions the number of agents-provocateurs has increased with the increase in indictable offences. The use of these paid spies is condemned by all but a minority of citizens, and the Englishman still prefers to commit his crime without the assistance of police or other agents. The use of agents-provocateurs fills most people with repulsion and loathing, it flouts our conception of law and justice, it discredits the executive and the police, and it sows distrust in the community.

The obvious implications of the employment of agents-provocateurs will be plain to every medical man, but there are two aspects which may less easily be recognised. Firstly, the present trend of medical legislation in this country is its concentration on industrial health rather than on health—a concern for the health of the worker rather than for the health of the citizen. Correspondingly the doctor is becoming more and more an appendage of the industrial machine, and more and more concerned with the patient's capacity to work. We may give grants to early cases of pulmonary tubercle in order to expedite the patient's return to work, or we may give extra food or perhaps in the future compulsory vitamins, in a concern for increased production. These measures may be necessary under war conditions; but the *doctor's job, even in a nation of shopkeepers, is to keep* or get the citizen well and not merely to keep him at the bench or lathe.

The second implication is far more sinister. If lying [illegible] stries or [illegible] "certi- [illegible] similar [illegible] to the disciplinary activities of the General Medical Council? The disciplinary work of the Council is already suspect by many members of the profession, the public, the law and the press. Before the GMC there is no subpœna of witnesses and no evidence on oath, and the doctor who has been convicted on the evidence of agents-provocateurs may find himself in a hopeless position and without the safeguards of legal proceedings or any real right of appeal. In the future the position will be as follows. Somebody suspects the doctor of something and informs the Minister of Labour or some other *Minister; the Minister informs Scotland Yard; Scotland* Yard informs its decoys; the decoys secure a conviction despite their lies; and then the GMC (a branch of the Privy Council) find the doctor guilty of infamous conduct in a professional respect and order the erasure of his name from the Medical Register. But perhaps by that time offences and erasures will have become so frequent that in order to conserve medical man-power the GMC will have power to instruct the Ministry of Health to stop the doctor's quarterly cheque in lieu of erasure!

The attempt to secure a verdict in the present case by the use of discreditable methods is of importance both to the public and to the medical profession. In the brave old world of the future not all the health centres in the country will be of much avail if the confidence between the doctor and his patient is to be destroyed by the stupid and clumsy methods of officials. What would have been the meaning of a verdict of guilty in a case such as the present one in the face of such mendacious activities of the prosecution? What are we to think of the intelligence and ability of the government and police officials who were responsible for advising and concocting such a prosecution? It will be a bad day when the first duty of a doctor, when asked for a medical certificate, is to satisfy himself that he is not dealing with a copper's nark. Finally, it is an ironical commentary on the situation that the doctor who was involved in the present case comes from a country where an arbitrary government acts through the secret police and the agent-provocateur—a country with which we are at present at war.

Harley Street, W.1. REGINALD T. PA[illegible] received treatment at home; others, who have attended at the health centre for purposes of investigation and ambulatory treatment; others again, who are referred to the centre because of industrial fatigue or other signs of sub-health. All these will need active rehabilitation before they are fit to resume full employment, and it is obvious that such treatment should be available on the spot, so that advantage can be taken of the other services—waiting-rooms, canteen, record-taking, &c.—there provided. Every health centre should therefore include a commodious gymnasium, for indoor exercises and remedial games; a suitably prepared ground for outdoor exercises, &c.; and accommodation for remedial handicrafts and other useful forms of occupational therapy.

There is an additional reason for the incorporation of a rehabilitation department in every health centre. The essential element in true rehabilitation is its emphasis on fitness, and the resolving of all difficulties, whether physical, psychological or economic, which prejudice a patient's return to full activity and usefulness. This requires the presence of skilled workers, trained in the handling of psychological problems, well informed on the causes of industrial breakdown and the physical and mental strains associated with particular industrial processes, closely associated with industrial welfare organisations and employment exchanges, and in close touch with residential rehabilitation centres to which the more serious cases should be transferred. The health centre is the natural and proper laboratory for these medico-social workers, and their presence at such a centre would not only complete the work of rehabilitation but would form the necessary link between curative therapy and complete restoration to active and useful life in the community.

Ealing, W.5. HAROLD BALME.

FOOT-DROP AND PRESSURE SORES

SIR,—A patient who has been in hospital for hæmatemesis has come out with bilateral foot-drop and a slough on one heel. A number of patients from various institutions, particularly infirmaries, seem to come out with foot-drop. All too often, on inquiry, it has been elicited that their toes have felt pressed down by carefully tidied tight blanketing, done with extreme hospital thoroughness to ensure that the bed shall look spick and span. It is high time that this state of affairs was terminated. Furthermore, every very ill patient ought to be cradled at once as loss of muscular tone alone may be enough to cause the foot-drop, without tight bedclothes. It is highly probable that tone is much less during rest and sleep and this may be an additional factor.

With regard to pressure sores on the heel, not only are these very painful and likely to make the patient's life a misery, but they can prolong disability considerably, for they often take months to heal. A posterior plaster slab extending half an inch beyond the toe tips and some distance up the leg, ensuring that the foot is at right angles, will not only add to the patient's comfort and prevent this condition but may save the necessity of cradling and avoid foot-drop. Great care should be exercised by nursing staffs to ensure that bedclothes are quite loose over the feet, so that they can be moved about with perfect freedom; this applies especially to elderly patients, who are unable to move round as much as young ones. The excuse that the patient will not get up again has actually been made on one occasion in a municipal hospital. This needs no further comment except that it is on a par with not troubling to ensure that the dying shall pass with clean, moist mouths, without bedsores, and without their agonising dyspnœa—often due to acute pulmonary œdema not eased with morphine.

Hove. J. HARTSILVER.

INTRA-ARTERIAL PENTOTHAL

SIR,—In my letter in your issue of July 10 I suggested that Lees's supposed case of idiosyncrasy to 'Pentothal' was in fact one of intra-arterial injection. This view was also taken by Clausen, as well as by Macintosh and Heyworth in their article drawing attention to the disastrous results that can follow this accident in technique. I know of another case resulting in eventual amputation, but I have not access to the details. I do not believe that, in these days of increasing pentothal [illegible]ion and war-time non-specialist anæsthetists, the risk of arterial puncture is so remote, but happily we can guard against such catastrophic results. Both of the cases reported by Macintosh and Heyworth were given 10% pentothal. In my opinion this practice is unwise, and is indeed not recommended by the manufacturers. In my personal series the only cases of *intravenous* thrombosis, except one in an old lady aged over 80, have been with solutions stronger than 5%. Also the practice of rapid injection carries a twofold danger, should the drug be intra-arterial—first, by not allowing dilution with circulating blood the concentration of pentothal is kept high; secondly, more irritant drug is introduced into the artery before the anæsthetist is warned by the patient's complaint of the burning sensation. Macintosh advises observation of the colour of the aspirated blood. This is rendered much easier if a straight varicose-vein mount is used between the needle and syringe.

Wimpole Street, W.1. F. W. ROBERTS.

OXFORD VAPORISER

SIR,—With the exception of the original articles by Macintosh and Mendelssohn and two letters in your correspondence columns, Captain M. Rushton's article of Oct. 23 is the first record of a user's experience with the Oxford vaporiser and I find it somewhat disappointing. One is left with the impression that, although the apparatus *does* work and that indeed it possesses certain advantages, Rushton is somewhat surprised that this is the case and looks on the vaporiser as something in the nature of a compromise to be used when other agents are not available.

Ether has been the most useful and most widely used drug for many years, and in the vaporiser one has at last an apparatus with which to administer it in a scientific manner. I maintain that, if properly administered, ether has only two disadvantages—it is difficult to administer (the Oxford vaporiser greatly reduces this difficulty), and the recovery period is longer than with some others. My figures do not show that the postoperative vomiting rate is higher with ether than with other drugs or combinations of drugs inhaled if one excludes a "short gas."

To take up various points in Rushton's article, giving the preanæsthetic two hours beforehand would ensure an easier induction, since the greater time involved obviates the undue depression of respiration which so often results if the premedication is given only an hour beforehand. Also the patient gets the full benefit of its sedative effect. I agree that induction is slower with ether only, but if given skilfully very few patients complain of any unpleasantness. This slowness is chiefly a factor of the time taken to reach surgical anæsthesia. A state of analgesia is attained quite rapidly and once this is achieved the patient is not concerned with what happens later. I have frequently given an ether analgesia with the Oxford vaporiser with nothing but gratitude from the patient.

The administration of chloroform and ether mixtures is unnecessary; they subject the patient to an avoidable risk and may reasonably be supposed to increase the postoperative vomiting. Induction after 'Pentothal' is usually quite easy with no addition to the ether/air mixtures delivered by the apparatus; in difficult cases ethyl chloride or vinyl ether can be given in the induction bag attachable to and supplied with the vaporiser. I have not found that ethyl chloride given in this way increases the liability to vomit to any noticeable extent.

I do not know why Rushton has found it necessary to deliver a flow of oxygen as a routine. In a large series of cases of all kinds I have rarely found this necessary. I do not understand his statement that one of the vaporiser's advantages over simpler apparatus is that the expiratory valve eliminates re-breathing, abolishes dead-space, &c. Admittedly there is no re-breathing with the Oxford apparatus (if the induction bag is out of circuit) but in most other types of apparatus the degree of re-breathing (if any) is controllable by the anæsthetist. I do not consider his statement that settings between 5% and 10% ether can be *often* maintained for long periods is, as he seems to suggest, in any way remarkable. In my experience these settings are suitable for most operations where abdominal relaxation is required.

Finally, some 18 months' experience with Oxford vaporisers used with ether or trichlorethylene has convinced me that this is one of the most generally useful pieces of apparatus yet devised, that it completely fills the needs of a mobile hospital, &c., and indeed is capable of meeting practically all the calls of a large general hospital.

From an RAF Hospital. R. L. SOPER.

IRRADIATION THERAPY OF NÆVI

SIR,—In his article on the therapeutic uses of thorium-X in your issue of Sept. 18, Dr. Corsi says with regard to nævus flammeus that "since no other satisfactory treatment is known, it is particularly fortunate that thorium-X therapy is available for treatment of at least the milder types of these nævi." I would like to draw attention to an article in the *Archives of Dermatology and Syphilology* for March, 1941 (p. 470) where Dr. Frederick Kalz states that, "Grenz ray therapy is the only method with which satisfactory cosmetic results can be achieved, since beta rays of radium cannot be used in large areas. In the deep type, a decrease in the redness, but not complete involution, can be achieved. The best results are obtained in infants and the percentage of cures successively decreases with age." Since 1936, grenz-ray treatments have been carried out by Dr. Leitner at St. Mary's Hospital and he has found the grenz ray effective in treating nearly all skin diseases which respond to X-ray therapy. He has had good results with nævus [illegible] grenz-ray treatment in dermatology, which gives an account of the common and rare skin affections, including nævus flammeus, which respond to grenz rays.

London. NELLIE I. LANCKENAU.

Public Health

A Sample of Tuberculosis in 1942

Dr. Lissant Cox's 29th annual report on the prevention and treatment of tuberculosis in the county of Lancaster is short in form but full of substance. Since 1938 there has been a rise each year in new pulmonary cases notified and the number in 1942 was the highest since 1933. Non-pulmonary cases have risen during the last three years. Nevertheless the pulmonary deaths in 1942 were the lowest on record and the non-pulmonary were stationary. The 88 deaths from tuberculous meningitis in 1942 compared with 97 in the previous year and the 5-year average of 85, with the usual age-distribution. More than 1000 new contacts were overhauled and the number of X-ray examinations in dispensary work reached the colossal figure of 17,250. Of the 4522 pulmonary patients on dispensary registers at the end of the year exactly a quarter had received surgical treatment of some kind. Referring to the new maintenance allowances Dr. Cox tells us that during the 3½ months up to Sept. 30 last 521 applications had been granted, at an average of £1 8s. 2½d. a week. His council has asked the Ministry for an extension of the scheme. In September there were 105 names on the waiting-list for institutional treatment, the present basis being 90 beds per 100 pulmonary deaths; another 150-bed sanatorium, Dr. Cox says, should suffice to prevent waiting.

Infectious Disease in England and Wales

WEEK ENDED NOV. 20

Notifications.—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 3098; whooping-cough, 1866; diphtheria, 705; paratyphoid, 4; typhoid, 8; measles (excluding rubella), 556; pneumonia (primary or influenzal), 978 (last week 785); puerperal pyrexia, 131; cerebrospinal fever, 51; poliomyelitis, 8; polio-encephalitis, 0; encephalitis lethargica, 2; dysentery, 176; ophthalmia neonatorum, 74. No case of cholera, plague or typhus fever was notified during the week.

The number of civilian and service sick in the Infectious Hospitals of the London County Council on Nov. 17 was 1916. During the previous week the following cases were admitted: scarlet fever, 202; diphtheria, 13; measles, 21; whooping-cough, 59.

Continued at foot of opposite column

Deaths.—In 126 great towns there were no deaths from enteric fevers or measles, 1 (0) from scarlet fever, 11(2) from whooping-cough, 10 (1) from diphtheria, 39 (1) from diarrhœa and enteritis under two years, and 106 (10) from influenza. The figures in parentheses are those for London itself.

Leeds reported 10 deaths from influenza, Bristol 9 and Bradford 7, no other great town more than 4.

The number of stillbirths notified during the week was 216 (corresponding to a rate of 37 per thousand total births), including 27 in London.

Obituary

FREDERICK CRAVEN MOORE

MD, MSC MANC, FRCP

Craven Moore was a Manchester man. He entered Owens College for a science course and took the BSc with first-class honours in biology in 1891, graduating in medicine—also with honours—four years later. After a house-surgeoncy at the Royal Infirmary his interest passed for a time from clinical medicine to pathology and he lectured in Delépine's department. But in 1901 he returned to clinical work as assistant to Dreschfeld whom he helped with investigations into gastric ulcer and enteric fever. In 1904 Moore was appointed physician to Ancoats Hospital and began with his house-physicians the series of investigations into the digestive functions and their disturbances by which he is best known. L. K., one of these collaborators, writes:

"It became an accepted fact that applicants for the post of house-physician at Ancoats were prompted by the desire to obtain Craven Moore's counsel as to subjects for an MD thes[illegible] his [illegible] least [illegible] orders of the stomach (1909), and the use of belladonna in dyspepsia (1910)—were read as joint papers to the Royal Society of Medicine. Moore was a good friend to his residents and visits to his house to talk over affairs were almost weekly occurrences. He had a wine cellar of port, which he often produced for the education of our youthful palates, though his own favourite beverage was tea. When Moore gave up his post at Ancoats in 1911 his old residents entertained him to dinner and presented him with a piece of autographed plate."

At that time Ancoats had no recognised place as a teaching unit in the medical school, but a few keen students availed themselves of Craven Moore's orderly and lucid teaching, enlivened as it often was by gentle leg-pulling. One such group included Geoffrey Jefferson and Harry Platt. At Moore's suggestion the occasional lectures given by the staff became a weekly series, alternately by physician and surgeon. This was the beginning of regular postgraduate teaching in Manchester and a few years later the system was adopted at the Royal Infirmary.

In 1911 Moore was appointed to the Infirmary staff. During his earlier years in consulting practice he was assiduous in his hospital work and rarely took more than a few days holiday, usually spent quietly at Port Erin where the biological station attracted him. During the last war he served as a captain on the à-la-suite staff of the 2nd Western General Hospital, combining this with civil hospital work and a growing consulting practice. On Murray's retirement Moore was appointed university professor of the principles and practice of medicine.

Of his human qualities a hospital colleague writes: Moore's temperament might perhaps best be described as urbane. In his earlier days he never spared himself and devoted all his energies to his profession; later, when success was assured, he took things more easily. He retired from his chair rather before he had reached [illegible] practice to live in a beauti- [illegible] Sussex. During his fifteen [illegible] centred upon his garden and his greenhouse. One of his most brilliant lectures was delivered to an audience of students on orchid-

Continued from previous column

growing as a hobby for doctors, and his demonstration of symbiosis between seeds and certain species of fungi was masterly. A year or two back he had a partial stroke which aged him, but he made a good recovery and this summer he and his wife—a daughter of the late Sir Edward Holt—were still carrying on their hobby happily. He died at his Sussex home on Nov. 18 in his seventy-second year.

TOM BATES

M B LOND ; F R C S

Mr. Tom Bates died at his home in Worcester after a short illness on Nov. 21, at the age of 65. He had been at work until less than a week before his death. His family's association with the Worcester Royal Infirmary goes back over sixty years, for he was the elder son of the late Mr. Tom Bates, who was appointed surgeon to the Infirmary in 1879. He was educated at Worcester Cathedral King's School and at St. Bartholomew's Hospital, where he qualified in 1904. A year later he obtained the fellowship, and after holding appointments as house-surgeon and as clinical assistant to the orthopædic department at Bart's he returned to Worcester. He was appointed an honorary surgeon to the Worcester Infirmary in 1909. During the last war his brother, Mr. Mark Bates, FRCS, also on the Worcester Infirmary staff, and later himself, left for service with the RAMC. Their father returned from retirement to active duties at the infirmary until his death in 1916, when Mr. Tom Bates was recalled. In 1921 he became senior surgeon and chairman of the medical staff committee. He was up to the time of his death chairman of the local medical war committee and group adviser under the EMS for parts of Worcestershire and Herefordshire. He also served on several committees of the Voluntary Hospitals Association.

The Worcester Royal Infirmary was very dear to Tom Bates and was probably the greatest interest of his life. He was looking forward eagerly to the bicentenary of its foundation in 1946 and was proud to claim that the British Medical Association had originated there. His characteristic outspokenness and ready wit might be misunderstood by those who did not know him, but his friends and patients knew him for a kind and generous man, who was always willing to give but who disliked being thanked. In committee or debate he had no use for talking round the point. Although not fond of public speaking he would intervene and in a few brief sentences define the problem, divested of all frills. He made many friends, was an ideal host and was to be seen in his happiest moods at the bridge table.

He leaves a widow, two sons, one of whom is a doctor, and a daughter. W. P.

JOHN GILMOUR

CMG, MC, M B EDIN, F R C S E

Major Gilmour, formerly president of the International Quarantine Board, Egypt, died in Edinburgh on Nov. 22 at the age of 59. He was an Edinburgh graduate and was seconded to the Egyptian public health department a year after joining the Royal Army Medical Corps in 1909. Recalled to the Army in 1914, he won the MC at the Dardanelles, served in East Africa, France and Palestine, and was a member of the war mission to the United States in 1917. He retired from the RAMC after the war and went to Persia with the League of Nations mission in 1924, and he had already made a reputation for himself as an epidemiologist when he became president of the Quarantine Board in Egypt in 1929. There he led a mixed team of English, French, Dutch, Syrian, Egyptian and other nationals engaged in quarantine control of shipping passing through the Suez Canal and in supervision of the annual pilgrimage to the Hedjaz. Those acquainted with the difficulties of such work appreciated Gilmour's fine qualities and his flair for leadership. He was a first-class organiser and his annual reports on the pilgrimage are models of their kind.

Early in 1926 he was seconded to the Ministry of Health to assist Sir George Buchanan, British delegate to the Office international d'hygiène publique, in revising the International Sanitary Convention of 1912, and he played no small part in the negotiations in Paris that led to the signing of the convention of 1926, which is still the basis of quarantine procedure throughout the world. In 1928 he returned to Egypt, but he was still a regular attendant at meetings of the Paris office, which he much enlivened. Soon after the Quarantine Board was transferred to the Egyptian government in 1938 he came back to this country, where he took up an appointment with the Ministry of Health, being later transferred to the Scottish Board of Health. His health was indifferent, but his wide knowledge, particularly of port administration and the control of shipping, was of great value during a period of stress in Scottish ports. Last year he was appointed a temporary inspector under the Cruelty to Animals Act.

"Wherever he went," says a colleague, "he made friends and won admirers. His breezy manner and his sense of humour made him one of the most popular of men and the most delightful of companions. At the same time, he was severely critical of inefficiency and could be scathing in his condemnation of inefficient or careless work."

"He was a great character," writes another. "Always good-tempered; making light of his many difficulties and problems; tactful, yet extremely persuasive when necessary, he was the ideal man to handle large native populations and to get them to do things which they did not want to do. Those who visited, with him, the quarantine camp at El Tor at the height of the Pilgrimage, will have imprinted on their minds a picture of Gilmour, spruce and cool, despite the great heat, watching and guiding the stream of disembarking pilgrims proceeding to the cleansing and disinfecting station. They will see him quietly intervening in some raging dispute over a missing garment and calming heated tempers by a laugh and a joke in which even the most irate Mussulman had to join.

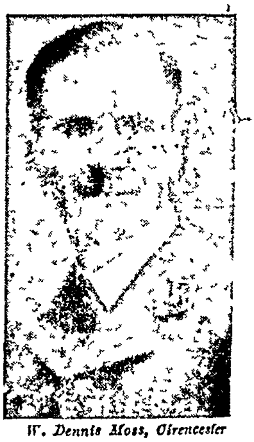
"A great deal of new work confronts those responsible for the control of epidemic diseases and the prevention of their spread across frontiers by land, sea and air, and the man whose personality, wide experience and wise counsel will most be missed, will be Jock Gilmour."

He was created CMG in 1934 and was a grand officer of the Order of Ismail and the Order of the Nile. He married in 1919; Mrs. Gilmour is left with two young sons.

WILLIAM STEPHENS PITT-PAYNE

MRCS; FLIGHT-LIEUTENANT RAF

Flight-Lieutenant W. S. Pitt-Payne died during October at the age of 37 while on active service overseas. He was educated at Dulwich College and, like his two brothers, studied medicine at Guy's where he qualified LMSSA in 1932. He took the conjoint qualification the same year and after holding a house-appointment at the Royal Hospital, Richmond, joined the family practice at Bromley, Kent, run by his father Dr. William Pitt-Payne, and by his two brothers both of whom are now also on active service. Bill Pitt-Payne was an all round sportsman. He was an enthusiastic member of the OTC at school and won his half-blue at Guy's for cross-country running. Riding was his favourite sport but he played golf, tennis, and rugby, enjoyed a day's shooting and spent several holidays skiing and skating in Switzerland. Though he had no children himself he was very fond of them and all Dr. Bill's young patients were introduced to what he called his "bribery and corruption department"—which consisted of a large bottle of sweets.



W. Dennis Moss, Cirencester

GEORGE HAMER LEIGH

M D MANC, D P H

Dr. G. H. Leigh, a former consultant tuberculosis officer of the Lancashire county council, died on Nov. 12, in Lancaster. He was born in 1876, and qualified at the University of Manchester in 1902, and later took his MD and DPH. After several house-appointments he spent three years in private practice, and before joining the county council as assistant tuberculosis officer in

1914, he was senior medical officer at the Westmorland Sanatorium, Grange-over-Sands In 1931, as consultant tuberculosis officer, he became responsible for the dispensary work in a large area stretching from Lancaster to Chorley with a population of 277,000 He was also visiting physician of the Lancaster Pulmonary Hospital He retired from the county-council service in 1940, but continued to devote his time and energies to the interests of his profession, and last year served as chairman of North-Western Tuberculosis Society

DR. LOUISA GARRETT ANDERSON

As one who knew her first as a fellow student and n, nearly 50 years later, in her home at Penn I am teful that your sympathetic notice of Louie Garrett derson should distil for others something of the rance of her character as well as its strength and satility "Courage, integrity and humour" were er better shown than in the laying aside of the ely country setting she had created for the purlieus the Euston Road with the onset of war The suffrate, the war surgeon, the biographer, the gardener, the end of her life was content to see that 'all was ll (after the bombing) and to wish everyone Goded" in the hospital associated with her name Very propriately it served her own need when her first and t illness developed Writing within a few days of her sing she spoke of welcoming death at 70 rather than erwise She paid tribute to "a very happy life, with most interesting profession and during the last war great chance." Rich endowment and opportunities dly appreciated and greatly used make indeed for the d life

L L C

Appointments

DREW, DOUGLAS MD BRIST, DMR radiologist to the Battersea General Hospital

OKSEY, F S MD LOND part time director of physical medicine at St Helier County Hospital, Surrey

LDING F CAMPBELL, MB SYDNEY MRCP, DMRE director of the X ray diagnostic department of the Royal Cancer Hospital (Free) London

DELL, C L MD LOND MRCP [illegible]

[illegible] to the [illegible] Hospital

LIE H S, MRCS examining factory surgeon for Winterton Lincs

GALL R M [illegible] of London [illegible]

BERTS, NOR [illegible] (temp) to [illegible] of the Royal Liverpool [illegible]

ART R, MRCS DPH DTM & H DOMS examining factory surgeon for Harrold Beds

Births, Marriages and Deaths

BIRTHS

DDARD—On Nov 24 at Windermere, the wife of Captain I D Beddard, RAMC—a daughter

MIF—On Nov 24 at Oxford to Dr M [illegible]

[illegible]—a son

MARRIAGES

DER—STRATON—On Nov 21, at Wilton Robert Edward Loder, lieutenant RAMC to Janet Straton SRN

RTIN—STEWART—On Nov 11, in London Thomas Dawson Masson Martin, MRCS, to Eileen Hannah Stewart

DEATHS

RKER—On Nov 23 at Berkhamsted Francis James Barker, MD GLASG consulting physician to the Hospital of SS John And Elizabeth London

ER—On Nov 23 Louis Edward Simon Beer, LSA, of Hampstead Road London N W 1

STMOND—On Nov 21 at Southsea Reginald Anthony Eastmond MB LOND formerly of Mansfield Woodhouse Notts

WLIF—On Nov 26 at St Andrew's Life Peter [illegible] ville, MB ABERD formerly [illegible]

LMOUR—On [illegible] MD MC, MB EDIN [illegible]

RKER—On [illegible] Parker MD CAMB, [illegible]

RNER—On Nov 2[illegible] [illegible] Turner

The fact [illegible]
to war co[illegible]
as an in[illegible]

Notes and News

AN UNOFFICIAL UNIT

THE Friends Ambulance Unit consists of about 800 men and women whose convictions debar them from combatant service During the past year they have been working abroad in Egypt, North Africa Syria, Ethiopia, India, China, and (as prisoners) Germany, while at home an average of 200 have made themselves useful while gaining experience, in British hospital The training of members of the unit is thorough but varied and in distant fields they have proved its worth by tackling unexpected duties Even in the organisation of an army, the developments of war reveal new needs for which full provision could not be made in advance, and the unit has been a convenient source of supplementary personnel for blood transfusion and other medical services of the MEF

Its primary object is to fill gaps, and it is not deterred from the attempt by their gigantic size S[illegible] with 37 [illegible] in Ethi[illegible] Syrian [illegible] unit is engaged on relief in India, helping refugees from Burma and trying to counter the ravages of floods, famine, and now cholera in Bengal A fourth, with 16 members is in China, where it maintains mobile surgical teams and distributes essential medical supplies through a vast territory spare parts for the trucks are almost unobtainable but they are "still running, through summer heat and winter snow in the course of a single day, from jungle valleys to passes at 10 000 feet, between places as separated as London and Constantinople" At home members of the unit have filled another kind of gap by offering themselves as subjects of clinical experiments on the transmission of virus infections, the testing of malarial remedies, and the treatment of oligæmic shock

With other agencies of the Society of Friends the unit is preparing itself, largely by practice for difficult tasks in postwar relief For such tasks Quakers are well qualified both by record and outlook M[illegible]

[illegible] do[illegible] Gordon Square, London, W C 1 The members of the unit are unpaid.

A CHARTER FOR HEALTH

IN our issue of Aug 28 (p 270) we noted that the Anglo Czechoslovak Founders' Committee is offering prizes for the best essay on an inter-Allied charter of health. The honorary advisory council, including Brigadier F A L Crew, Prof W E le Gros Clark, Prof Lancelot Hogben, Sir William Beveridge, Mr Jan Masaryk, Prof John Ryle, Sir John Boyd Prof S Zuckerman and others, are prepared to extend the period of entry until Dec 31 Competitors are free to deal singly or jointly with two main issues

1 A survey of postwar relief schemes and other measures for health planning
2 Draft of a project to implement article 6 of the Atlantic Charter with reference to health

Prizes are £30 and upwards, and the competition is open to doctors biologists research workers in services connected with health nurses and medical auxiliaries Entries should be forwarded to the Health Charter Study Group, 18 Grosvenor Place, S W 1.

NURSES FOR RELIEF WORK

AT a meeting of the Council of the Royal College of Nursing on Nov 18 it was decided to form a register of nurses wishing to help in relieving war stricken countries when peace comes The aim will be to supplement the national efforts of the countries concerned The RCN is affiliated to the Council of British Societies for Relief Abroad, and will recommend suitable volunteers to societies seeking state registered nurses for relief At the request of these societies the college w[illegible] verify the qualifications and suitability of any [illegible]tered nurse volunteering directly to a so[illegible] suggests that such societies should for[illegible] all volunteers applying to them [illegible] college has been asked to scrutinise th[illegible] or not The Leicester branch of the [illegible] to further relief work.

RADIOTHERAPY IN LONDON

SOME difficulty has been experienced in providing irradiation treatment for cancer at hospitals in inner London, so arrangements have been made for both X-ray and radium treatment to be carried out at two hospitals in the London sectors—one north of the Thames, at Mount Vernon Hospital, Northwood, and one on the south side at Warren Road Hospital, Guildford. Patients from sectors 2–5 inclusive will, as at present, go to Mount Vernon, and the southern centre is now ready to receive patients from sectors 6–10. Only patients who are likely to respond to treatment should be sent to the centres, and transferring hospitals must be prepared to take them back if investigation at the centre shows them to be unsuitable for treatment there. The southern centre will be staffed by whole-time medical and technical staff, with visiting consultants from several of the inner hospitals, which are loaning radium and other equipment. Surgeons who wish to treat their own patients at the centre can do so by arrangement with the medical superintendent.

University of Oxford

In a Congregation held on Nov. 20, the degrees of BM, BCh were conferred on John Badenoch and Andrew Henderson Torrance (in absence).

Royal Society of Medicine

A meeting of the fellows of this society will be held on Tuesday, Dec. 7, at 4 PM. On Dec. 10 at 2.15 PM the clinical section will meet at the Brompton Hospital, Fulham Road, S.W.3. The house and library will be closed from Dec. 25 to 27, both days inclusive.

Pharmaceutical Society of Great Britain

At a meeting to be held at 17, Bloomsbury Square, London, W.C.1, on Tuesday, Dec. 9, at 7 PM, Mr. Arthur Mortimer, MPS, deputy director of medical supplies to the Ministry of Supply, will speak on the ministry and its relation to the pharmaceutical industry.

Discharged Service Patients

The Minister of Health has now decided (circ. 2530C) that men and women invalided from the Forces and not entitled to a pension, when admitted or transferred to an EMS hospital, will remain an EMS responsibility until their treatment is completed or for six months whichever is the earlier. If there has been a break in treatment and it becomes necessary within the six months to readmit the patient to hospital the regional hospital officer (or in London the EMS director at the ministry) should be consulted. A patient still receiving treatment six months after being boarded out will normally be dealt with as an ordinary civil case, with the proviso that essential treatment is not to be interrupted.

Jaundice made Notifiable

There is evidence of an increasing prevalence of the infective types of jaundice, and an intensive study of the epidemiology and pathology of the disease has been undertaken by a team working at Cambridge in collaboration with the Medical Research Council. To provide these workers with the fullest possible information about the incidence of the disease the Minister of Health has brought into operation in all districts in the Eastern region, where the research is situated, the Jaundice Regulation, 1943. These regulations make compulsory notification to the medical officers of health of cases of catarrhal jaundice, acute inflammation of the liver, acute necrosis of the liver, acute yellow atrophy of the liver, toxic jaundice and infective jaundice.

Town and Country Planning in Scotland

From Feb. 11, 1944, all land in Scotland will be subject to controlled planning and cannot be developed without the consent of a local planning authority. This broadly is the combined effect of the Town and Country Planning (Scotland) Act 1932 and the Town and Country Planning (Interim Development) (Scotland) Act 1943 which has just become law. The new act places the onus of seeking and securing local-authority approval for development proposals on the landowner, who can, however, appeal to the Secretary of State if he feels aggrieved at consent having been refused. It also gives planning authorities a right to authorise the erection of gs for a limited period and determines that these gs can be pulled down at the end of the period without of compensation.

Leeds Joint Council on Industrial Medicine

This council, which is made up of representatives of the Leeds division of the BMA, of the trade unions, of the local branch of the FBI and of the local chamber of commerce was inaugurated in October 1942 to coördinate industrial medicine for the common good. During the year notes have been circulated to employers and trade unions on facilities for the treatment of scabies and pediculosis, on day nurseries, war-time nutrition and canteen feeding. Attention has been given to short-term absenteeism, medical certification and hours of work. The opinion has been circulated that for men and for women, where such women have no particular home responsibilities, a six-day week of 55 hours including overtime is the optimum; for women with home responsibilities a five or five-and-a-half day week would be desirable. Rehabilitation of disabled workers has been discussed with Government departments. Hospital authorities have been approached to obtain priority treatment for key workers; at the Leeds Infirmary a mixed committee has been appointed to oversee the arrangements. The appointment of works medical officers is being promoted and an extension of industrial nursing. The hon. secretary of the council is Dr. J. Vaughan Jones, 161, Hyde Park Road, Leeds 6.

Workmen's Compensation

Since last Monday many workmen receiving weekly payments under the Workmen's Compensation Acts will be entitled to an increase in the supplementary allowances granted under the Act of 1940. Where weekly payments have been made for thirteen weeks or more the increases are, for a single man or woman, 5*s*. per week, making a maximum of 40*s*., and for a married man 15*s*. per week making the maximum 50*s*. There is also an increase of 5*s*. for the married man during the first thirteen weeks. Total compensation to totally disabled workmen must not ordinarily exceed two-thirds of the workman's pre-accident average weekly earnings. The allowances for children are increased to 5*s*. for each child born before the accident or within nine months thereafter, and under 15 years of age, and a concession has been made for children of 15 receiving full-time instruction in a school. These allowances must not increase the total compensation for total disablement to more than seven-eighths of pre-accident earnings. In fatal cases the minimum payable where adult dependants are left is increased from £200 to £300 and the maximum from £300 to £400; and where children under 15 are left in addition to an adult dependant the aggregate maximum is increased from £600 to £700.

Medical Casualties

The following RAMC officers have been posted as prisoners of war:

Captain F. E. de W. Cayley, MRCS; Captain A. K. Eastwood, MRCS; Captain R. M. J. Franks, LMSSA; Major A. C. King, FRCS; Captain James Ledingham, MB ABERD.; Captain M. T. O'Sullivan, MRCS; Major T. M. Pemberton, FRCS; Captain J. Richardson; Captain P. G. Seed, MRCS; Lieut.-Colonel J. H. Strahan, MB BELF.

Medical Honours

The following awards have been made to RAMC officers in recognition of gallant and distinguished services in the Middle East:

CBE.—Brigadier R. W. Galloway, DSO, MB ABERD.

OBE.—Lieut.-Colonel C. W. Arnot, MC, MD DURH.; Lieut.-Colonel D. W. Jolly, MB NZ; Colonel F. R. H. Mollan, MC, LRCPI; Colonel J. G. Morgan, MB; Lieut.-Colonel A. N. B. Odbert, MB DUB; Lieut.-Colonel P. J. Richards, MRCS; Lieut.-Colonel R. MacL-Savege, MC, FRCSE; and Lieut.-Colonel H. S. Ward, MRCS.

MBE.—Major A. J. C. Latchmore, MS LOND.

The George Medal has also been awarded to Lieut.-Colonel R. McI. Gordon, DSO, DFC, MC, MB GLASG., in recognition of gallant conduct in carrying out hazardous work in Middle East in a very brave manner.

". . . In most teaching schools the public health cour still consists of a series of lectures spread over a single ter in the student's curriculum, usually in the final year. Whil the subject matter has increased enormously in scope a complexity during the past quarter of a century the tim devoted to it remains the same. No attempt is made to correlate preventive and social medicine with the other subjects which the student has to learn. Nor is he invited to study his patients in relation to their family, industrial or social background. This is not surprising when all hi teachers, with the sole exception of the lecturer in public health, are trying to cure rather than to prevent. Before reforms can become effective a new generation of professors and clinical demonstrators will need to grow up and the entir medical curriculum must be revised."—Dr. R. H. H. JOLLY in a presidential address to the Society of MOH's on Nov. 2

HEALTH OF THE FACTORY WORKER IN WARTIME *

S. A. HENRY, MD CAMB, MRCP, DPH, DTM
HM MEDICAL INSPECTOR OF FACTORIES

WHAT I shall here describe to you is the result of work performed not only by myself, but more so by colleagues both inside and outside the Ministry of Labour, while I act only as the mouthpiece. Such team-work does not call for reference to each individual name, but I would be failing in my duty if I did not pay tribute to the work and guidance of Dr. J. C. Bridge, until recently senior medical inspector. I can best explain my attitude by using what I am informed was one of the favourite quotations of a great surgeon: "I have gathered a posie *of other men's flowers and nothing but the thread that* binds them is mine own."

There are over a quarter of a million factories in this country, and the term "factory" is defined in the Factories Act as embracing not only the familiar mill building in which work is carried on by way of trade or for purposes of gain, but also a number of other premises in which persons are employed in manual labour such as a [illegible] pairing, a factory line or [illegible] Mines and quarries are [illegible] ies Act, and of them I have no right to speak.

But the act has special application to certain premises which do not come within the definition of a factory, such as an electrical station, a dock warehouse, a wharf or quay or wet dock for loading and unloading ships, a building under construction, and works of engineering construction.

Though factory workers—of whom there are some 7½ millions—may run the risk of some special accidents and maladies which are more or less peculiar to their employment, they are also liable, when returning home or to the outer world after the day's work, to contract those forms of ill health which are found in the general population whose guardian is the Ministry of Health, and of which the incidence is so much greater than that of the special maladies of industry of which I wish to speak mainly today. For every case of industrial disease or gassing in this country, there are over 50 cases of tuberculosis and over 500 cases of infectious disease.

It may even be that the worker in a clean, well-ventilated, well-lighted and well-organised factory with welfare and canteen facilities provided and used, is less likely to contract therein the common illnesses to which all human beings are subject than in the overcrowded bus, railway carriage, place of entertainment, air-raid shelter, or even the home both of rich and poor.

At present it may not be amiss to view through military spectacles the factory worker's bodily injury (which in the Factories Act includes injury to health) as caused by an enemy which has to be fought and overcome. But before we can do this we must know the identity of the enemy—whether it be dangerous machinery, a micro-organism, a ray, or a toxic dust, liquid, or fume—where he lurks and in what strength he exists.

This information is obtained by means of statutory notification of accidents and industrial disease to the Factory Department—a "department of intelligence," if I may say so—whose inspectors also act as military police, backed by the powers of the Factories Act, though as the Minister of Labour and National Service has recently pointed out their rôle has of late years tended to become more that of the welcome adviser to employer and employed, with sanctions in the background.

Though the earliest factory legislation in this country was aimed at *the prevention of fatigue from long hours* of work in badly ventilated factories, the prevention of accidents has for years been by far the best-recognised problem of the factory inspectorate. The Chief Inspector is usually a trained engineer, though at the end of the last century a medical man occupied the post on one occasion—Sir Arthur Whitelegge, a man of great administrative ability and a fellow of this college.

He recognised the necessity for including a medical adviser in the factory inspectorate in the person of Thomas Morison Legge, the first medical inspector of factories, on whom this college bestowed the Bisset Hawkins gold medal in 1921 in recognition of his fight against industrial disease, especially lead poisoning. His era will be considered by many, including those few remaining medical inspectors (Dr. Middleton, Dr. Horner and myself) who had the honour of working under him, as the "golden" era, rather than the "lead" era, of industrial medicine, for his strongly laid foundations will remain, however often the edifices built upon them may be extended, destroyed or rebuilt in some other way.

ACCIDENTS

The term "accident" is not defined by the Factories Act and its legal interpretation in certain cases may have to be left to the courts, but *speaking generally, it is* an unlooked-for mishap or an untoward event, not expected by the sufferer; and its sudden occurrence can be related to a particular time. The main causes are mechanical, electrical, or chemical.

Machinery and allied accidents, which are by far the most numerous, are mainly an engineering problem and *are dealt with, primarily, by the ordinary departmental* inspector assisted by specialised engineering inspectors under a senior engineering inspector.

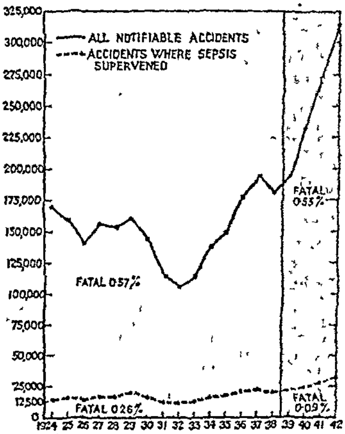


FIG. 1—All notifiable accidents compared with the numbers in which sepsis supervened.

Official figures for accidents in factories are based on notification, which is only statutory for those which are fatal, or which disable the workman for more than three days from earning full wages at the work at which he was employed. The statutory position was somewhat different before 1924, and the figures before that are not comparable with later figures; fig. 1 only shows the position from 1924 onwards.

The number of accidents from all causes has shown a progressive increase from nearly 103½ thousand in 1930 to nearly 312½ thousand in 1942; but needless to say the number of persons employed in factories has also progressively increased, and includes those previously unaccustomed to factory life and conditions. *The percentage of fatal cases has fallen slightly from* 0·57 before [illegible] period [illegible] over [illegible] the age of [illegible].

The actual number of cases in which sepsis supervened has also increased from approximately 21½ thousand in 1930 to 32½ thousand in 1942, *but not in proportion,* as will be seen from fig. 2; in fact, the percentage of such cases to the total fell to 10 in 1941, which is the lowest percentage since 1925—the highest figure being 11·7 in 1936. Further, fewer cases of sepsis have proved fatal, for the percentage mortality has fallen from a pre-war average of just under 0·3 to just under 0·1 during the war; actually, 1942 provided the low percentage of under 0·05.

Electrical accidents, which are the main concern of the senior electrical inspector and his specialised staff, have

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* The first of two Milroy lectures, delivered at the Royal College of Physicians on Feb. 23, 1943. The lecture will be concluded in our next issue.

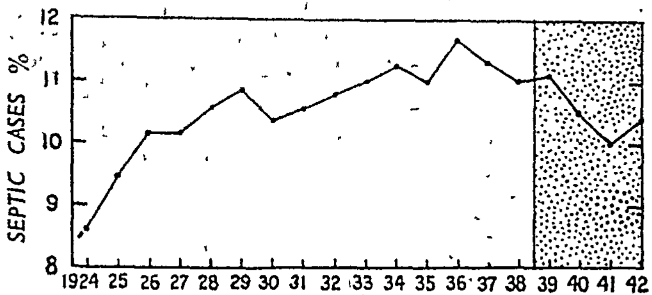

Fig. 2—Percentage of septic cases to total numbers of accidents.

increased in number since the war (fig. 3), reaching the figure of 1029 in 1942 as compared with the lowest figure of 313 in 1932. On the other hand, the percentage of fatal cases has fallen to a figure below 5 for the first time, the highest being 8·3 in 1929, and the lowest 4·3 in 1940 (fig. 4). I need only say in this connexion that the importance of continuing artificial respiration, if necessary for many hours until it is absolutely certain that life is extinct, can never be too widely advertised.

The causation and prevention of gassing accidents, which is the term in use for accidents caused by inhalation of gases, fumes or vapours, present important problems for the medical inspector in close coöperation with the specialised chemist of the engineering branch.

Fig. 5 shows the number of gassing accidents which have been reported annually since 1924. There was a considerable rise in 1940 and 1941, but whereas there was a mortality of 9·6% during the 15 years before the war, the percentage mortality during war has been 4·6. A few important gases have contributed mainly to this rise in incidence. The number of cases of gassing by carbon monoxide has risen progressively (fig. 6), both blast-furnace and power- or producer-gas contributing, while coal gas, and carbon monoxide from other sources such as exhaust gases from engines, or coke or charcoal-fire braziers or stoves (usually in a confined space as on board ship or even in one case in a lavatory) did not contribute significantly until 1941.

It is difficult to assess how many were due entirely to war conditions. The number of cases of gassing occurring during the performance of normal duties was mostly related to diminished ventilation consequent on structural alterations to prevent glare. Many occurred during blackout hours and several which were indirectly due to air-raid warnings or enemy action would certainly not have happened in peace-time.

The percentage of fatal cases during this war as compared with the average for the 15 years before has fallen from just over 10 to just over 8; but while the percentage for blast-furnace gas has fallen from 18·5 to 12·5, for producer gas from 7 to 5·5, and for coal gas from just under 9 to 5, that from other sources of carbon monoxide has risen from 7·5 to over 9.

At the beginning of this century a mysterious illness with a 23·3% mortality affected at least 120 human beings, a dog and a canary, during transport by water of high-grade ferrosilicon produced in an electrical furnace. The illness, which included giddiness, severe gastric intestinal disturbance and collapse, was at first variously diagnosed, and foul-play was even suspected in a fatal case in a Russian refugee. However, investigation eventually revealed the cause as phosphuretted hydrogen evolved by the action of moisture or moist air on the calcium phosphide present in the alloy.

During the last war, though gassing by phosphuretted hydrogen was anticipated in connexion with the preparation of calcium phosphide—used in considerable amounts for filling certain kinds of flare mines—no serious effects were observed. No cases were reported in the interval between the last and present war, but in 1940 there were 19 cases of such gassing without fatality; these might equally well have occurred in peace-time, since they were due to an unfortunate error: a ship's cabin was being cleaned by spraying water, and some fell on an open tin of calcium phosphide which had been placed in the cabin by mistake.

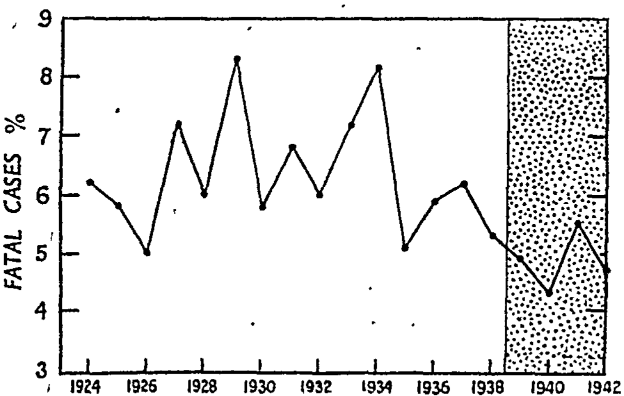

Fig. 4—Electrical accidents: percentage of fatal cases to total number.

But nitrous fumes have been responsible for much of the increase in the number of cases of gassing during the war (fig. 7). Fortunately, most of the cases have been mild, the percentage mortality being well under 1 as compared with 10 before the war. All but 14 occurred in the manufacture of explosives such as trinitrotoluol and trinitro-phenyl-methyl nitramine, formerly erroneously called tetranitromethyl-aniline (hence the name tetryl). Lack of experience among management and workers is an important factor in causation.

It is worth recalling that in 1934 an important new source of gassing by nitrous fumes came to light, 9

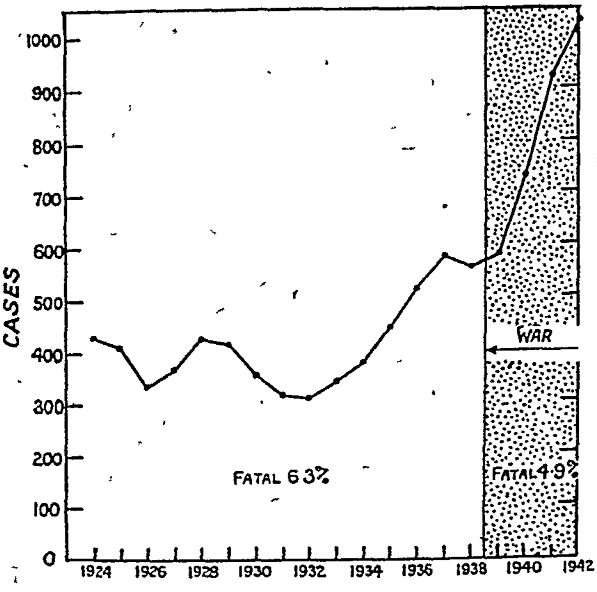

Fig. 3—Electrical accidents.

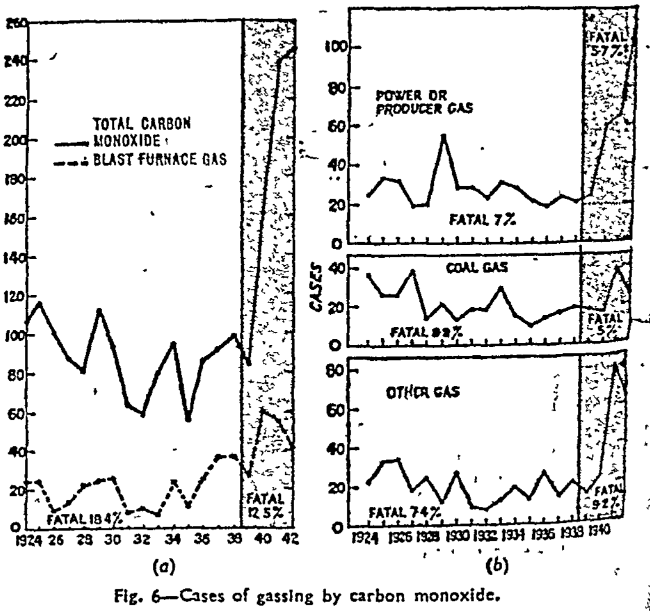

Fig. 6—Cases of gassing by carbon monoxide.

cases being reported from the use of large oxy-acetylene burners on a liner, for the purpose of heating a heavy ste[illegible] to its removal fro[illegible] were reported in [illegible] acing a cross-hea[illegible] vestigation by the government laboratory and a chemist of the factory department revealed that the fumes were the result of the high temperature flame on the nitrogen in the air. Since the war only 1 such case has been reported, again when a crosshead was being replaced.

INDUSTRIAL DISEASES

But there are certain substances which when inhaled or otherwise absorbed in sufficient quantity cause immediate effect, classified as an accident, but which when absorbed in smaller quantities over a period, may cause a chronic effect with a different clinical picture. It may be necessary for purposes of compensation to schedule the more chronic effect as an industrial disease. Examples are to be found in poisoning by tetrachlorethane (causing toxic jaundice), diethylene dioxide or dioxan (causing hæmorrhagic nephritis), and, during this war, methyl bromide, scheduled on June 1, 1941, and tricresyl phosphate and triphenyl phosphate, scheduled on Aug. 1, 1942.

Between the end of 1940 and the middle of 1941, 3 workers who had been employed for periods varying from 8 months to 3½ years in the manufacture of oily tricresyl phosphate or triphenyl phosphate, or both, for use as plasticisers in cellulose lacquers, were found to be suffering from a form of paralysis simulating infantile paralys [illegible] calf muscle [illegible] a slapping [illegible] limbs with [illegible] that the cases were similar to those of “ginger” or “jake” paralysis in America caused by accidental ingestion of ortho tricresyl phosphate.

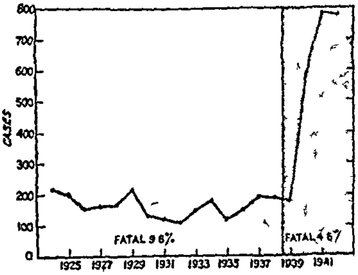

Fig. 5—Gassing accidents

The first notified case of gassing by methyl bromide was in 1937 when a man who had been filling fire extinguishers for 6 weeks in the open air with this chemical suffered ill effects necessitating hospital treatment for 2 weeks. Since 1939, however, 13 cases have been reported, 3 of which proved fatal, 7 arose during the manufacture of the chemical and 6 during the filling of a fire extinguisher or as a result of accidental leakage from one.

In one man who died while engaged in the manufacture, the onset of symptoms seems to have been delayed. He collapsed and died on the road on the way home from work, and post-mortem examination showed cerebral and pulmonary œdema. Apart from local blistering of the skin, which is not uncommon without other signs or symptoms, the clinical picture is one of irritation of the alimentary and to a less extent of the respiratory tract; the central nervous system is seriously affected, with disturbance of speech and vision, headache, drowsiness, ataxia or even convulsions in some cases. In one case, a sample of cerebrospinal fluid was found by the Government chemist to contain 16 times the normal amount of bromine, which averages 1 mg. per 100 ml.

But this should not detract our attention from the selective action on the central nervous system of the important organic radical ‘methyl’ which is also present in such industrial products as methyl iodide and methyl alcohol (methanol). In the past these and allied products with the exception of methyl mercuric iodide have shown no serious adverse effects, but in war-time, when exposure by day and night may be increased, our vigilance must be maintained, more products may eventually have to be transferred from the list of those causing accidents to that of those causing industrial disease. In 1941, for example, there was an isolated fatal case of gassing by methyl iodide, with effects rather similar to those of methyl bromide, in a man who had been employed at intervals in its manufacture for a year; and the effects of ingestion of methanol are already well known.

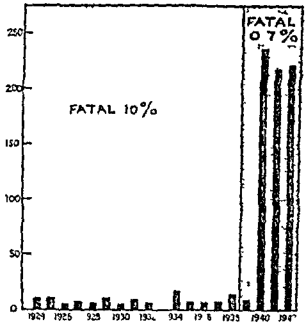

Fig. 7—Cases of gassing by nitrous fumes

There has been a decided increase during the war in the number of cases of acute gassing from the anæsthetic vapour of trichlorethylene (fig. 8), the main increase (as it was in the prewar period) being in the process of metal degreasing.

Dry-cleaning was a prominent cause of gassing by trichlorethylene before the war, but the decline in this use is reflected in the absence of cases from this source since 1939. It was responsible for 2 fatal cases in that year, in which delayed action seems to have been associated with exertion. In one case a refugee trainee, aged 17, with a previous history of vomiting employed as a dry cleaner, was found in his bedroom, dying, following a meal after a long day's work. The pathologist, in his evidence at the inquest, was of the opinion that the coma was probably precipitated by climbing four flights of stairs, and that the immediate cause of death was inspiration of material vomited during coma.

The other case was in an apparently healthy man of 20 who had for some time been subjected to rather heavy concentration of trichlorethylene vapour in dry cleaning. He left his work in the normal way, was found forty minutes later in the street near his home, deeply comatose, and died before reaching hospital.

Benzene (benzol) furnishes a link between accident and industrial disease, for while it may cause an acute gassing accident it may also cause a more chronic condition with a totally different picture, which has been scheduled as an industrial disease for compensation. In order to obtain information as to how and where it occurs, with a view to prevention, chronic benzene

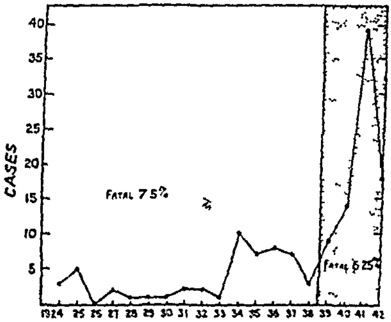

Fig. 8—Cases of gassing by trichlorethylene (C_2HCl_3)

poisoning was added to the list of notifiable diseases, which now number 14.

NOTIFICATION OF INDUSTRIAL DISEASE

It would be illuminating if the Ministry of Information could tell us what percentage of the medical profession are aware that notification of any industrial disease is required, let alone the names of these 14 diseases on the list. They are lead, phosphorus, and arsenical poisoning and anthrax, from 1896; mercurial poisoning from 1899; toxic jaundice from 1916; epitheliomatous and chrome ulceration from 1920; carbon bisulphide, aniline and chronic benzene poisoning from 1925; manganese poisoning from 1936, compressed air illness from 1939, and toxic anæmia from 1942.

Fig. 9 gives some indication of the total numbers notified annually from 1913. Sometimes after preventive measures have resulted in reduction of numbers a new disease added to the list causes a temporary rise until again preventive measures have made themselves felt. But the rise during the present war is mainly due to the two effects of trinitrotoluol—namely, "aniline poisoning" and to a less extent "toxic jaundice."

Some industrial diseases require for their production many years of exposure to the causal agent, and therefore their manifestation during war-time has little or no relation to that period, but rather to a previous period. Hence I shall not make further reference to the non-reportable pulmonary diseases such as asbestosis, byssinosis of cotton-workers in processes preparatory to spinning, and silicosis, though these are subject to compensation under special schemes, or to fluorine osteosclerosis, or to cancer of the urinary bladder in makers of synthetic dyes; or to the notifiable diseases manganese poisoning in grinders of manganese ore, and epitheliomatous ulceration of the skin in workers in pitch, tar, bitumen or mineral oil.

I must make some reference, however, to cancer caused by arsenic. The disease notifiable is arsenical (and not arsenic) poisoning (fig. 10), which may, therefore, be interpreted as poisoning by any arsenical compound which occurs in industry in the form of dust, gas or vapour, though the resulting signs and symptoms may bear very little relation to one another.

Dust from such salts of arsenic as sodium arsenite, lead and calcium arsenate, and arsenic trioxide (white arsenic), to which workers are exposed in extraction of arsenic and in the manufacture of insecticides or weed killers, give the classical signs, and are responsible for 11 of the 12 cases occurring during this war. Of these 3 were fatal and presented in the final stage the feature, unrelated to war-time, of primary cancer of the lung preceded by primary keratotic new growths or epitheliomata on the skin of the trunk (which is the site of election of these cutaneous new growths) or on the lower limb, and, in one case, non malignant perforation of the nasal septum. In previous years some half-dozen cases of cutaneous cancer—5 in sheep dip workers and 1 in a worker manufacturing emerald green—had been included. If the interesting suggestion proves correct that nasal and pulmonary cancer in nickel workers is attributable to contact in the past with an arsenical compound no longer used, such cases should presumably be notifiable under the heading of arsenical poisoning.

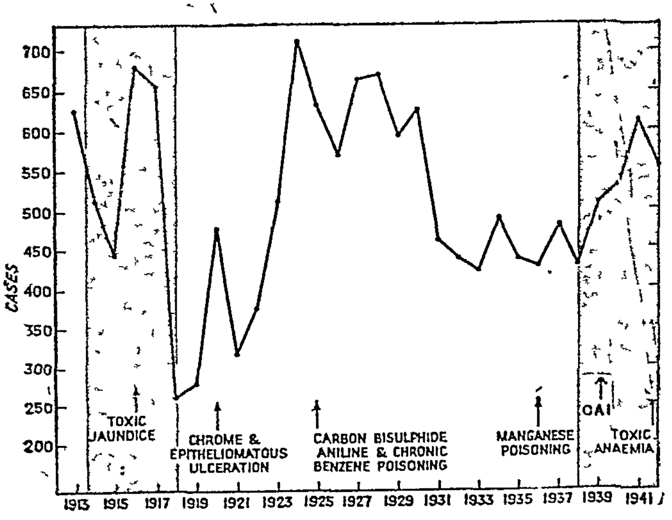

Fig. 9—Cases of industrial disease and poisoning notified since 1913. Lead, phosphorus, arsenical and mercurial poisoning, and anthrax, were all notifiable that date. CAI = compressed air illness.

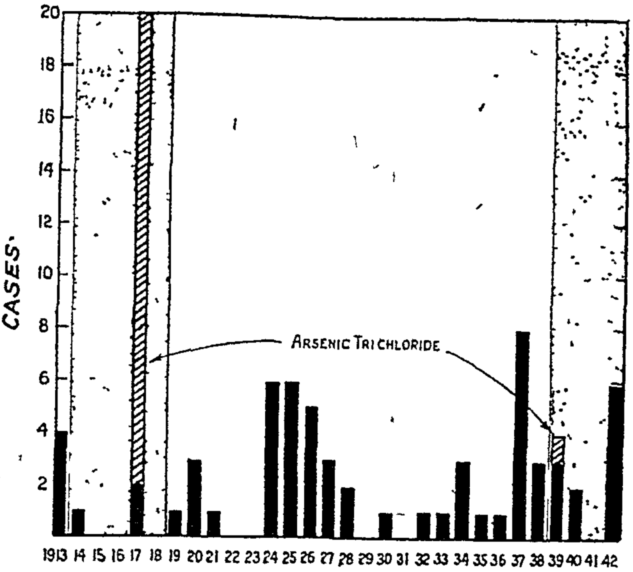

Fig. 10—Arsenical poisoning (excluding cases caused by arsine)

The vapour of arsenic trichloride may cause intense irritation of the mucous membranes and of the skin, causing ulcerative dermatitis. Although 18 of the cases included under the heading of arsenical poisoning during the last war were due to this product, manufactured for chemical warfare, the only case during the present war arose from the use of this chemical in the making of an anti-fouling paint. Death was from bronchopneumonia with some change in liver and kidneys. The use of this paint on ships will have to be borne in mind when, after the war, shipbreaking becomes commoner and the oxy-acetylene blow-pipe flame is used; the known lead hazard may then be augmented by an arsenical hazard.

Before 1916, when toxic jaundice became notifiable, cases of jaundice notified as attributable to arseniuretted hydrogen were included under arsenical poisoning, but since that date 59 such cases, with a mortality approaching 24%, have been included under the heading of toxic jaundice. Only 3 of these have occurred during the present war and none was fatal, as compared with 17 during the last war of which 6 were fatal.

But the most important chemical causing toxic jaundice is the explosive trinitromethylbenzene or trinitrotoluol, called for short TNT in this country; it has been christened tolite in France, trilit in Spain, and in some other parts of Europe trotyl or trinol. This chemical may produce a variety of effects. It may merely give rise to a condition which is not notifiable and is known as TNT sickness or gastritis, the symptoms being drowsiness, headache, nausea and abdominal pain. It may, or may not, be associated with cyanosis, which is a form of anilism and is notifiable as aniline poisoning. Thirdly, jaundice may develop, and the case is then notifiable as toxic jaundice. Fourthly, an anæmia of dyshæmopoietic type may occur, and the case is then notifiable as toxic anæmia. All these, when disabling, are subject to compensation under the heading of poisoning by nitro or amido derivatives of benzene. Lastly, there is the external effect of dermatitis which is not notifiable but is subject to compensation as "dermatitis produced by dust or liquids."

(To be concluded)

In medical education now the fundamental idea seems to be that there is something particularly degrading about sick folks and it is imperative that the student be kept away from such contamination as long as possible. . . . Of course *Paradise Lost* is a requirement and rightly so because it teaches the students that there was a hell worse than the premedical course, a thing difficult to comprehend.—ARTHUR E. HERTZLER, of Halstead, Kansas. *Anesth. & Analges.* 1943, 22, 297.

INFECTED BURNS AND SURFACE WOUNDS

THE VALUE OF PENICILLIN

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THIS war has produced surface wounds in large numbers. Many are burns caused by flame; others are injuries by bomb or shell fragments. In the early stages these two types of wound differ, but later they become similar.

For practical purposes two depths of burn should be distinguished, (1) the superficial burn with partial skin destruction, and (2) the deep burn with complete skin destruction.

In the absence [illegible] burns heal in 7–20 days. [illegible] epithelial cells remaining i[illegible] and sebaceous glands (Barret Brown 1942). Destruction of the remaining skin layers by gross infection has the effect of transforming a superficial burn into a deep burn.

Deep burns and almost *all* the surface wounds of warfare destroy the skin completely and (unless skin grafts are used) they can heal only by epithelial growth from the edges of the wound. This paper is based on a large number of cases with complete destruction or loss of skin, of which 75 have been treated with penicillin during the last 15 months.

CONTAMINATION AND INFECTION

Three stages of infection may be distinguished:—

(*a*) *Contamination.*—In the early stages of a burn—whether caused by flame, acid or moist heat—the dead skin forms a protective layer. Immediately after the accident *this is sterile, but early contamination from* clothes, the surrounding skin, or the respiratory tract is common. In about 40% of the cases of burns received in this unit within 8 hours of the accident hæmolytic streptococci or pathogenic staphylococci have been cultured. This agrees with the findings of Cruickshank (1935) who reported that 11% of a series of 100 fresh burns were infected with hæmolytic streptococci and that by the end of the second day this figure had risen to 50%.

For 6 hours after burning these organisms do not invade the tissues but are simply contaminants. They can therefore be removed by a suitable cleansing and the use of an antiseptic.

(*b*) *Invasion.*—Within 48 hours, in the absence of effective cleansing, such organisms begin to invade the tissues and may give rise to all local and general signs of an acute infection.

(*c*) *Established infection.*—Without specific treatment, infection persists until the wound heals.

In burns the invasive period is usually prolonged. Its initial intensity tends to be reduced by the presence of skin sloughs, which afford protection and give time for [illegible]

With surface wounds of mechanical origin the immediate exposure of living tissues—unprotected by the skin sloughs that cover a burn—increases the risk of active invasion. But this danger is offset by the fact that the first-aid treatment of wounds is generally better than the first-aid treatment of burns and that the importance of early wound toilet is widely appreciated.

FLORA OF SURFACE WOUNDS

Hæmolytic streptococcus.—The incidence of this organism has been variously reported as from 30% to 80%, and this fits in with my findings in 160 major burns and many other surface wounds. Hæmolytic streptococci are responsible for the most serious of the local and constitutional disturbances. They often stop the growth of epithelium or even cause regression of the healing edg[illegible] freshly healed skin may [illegible] they sometimes live on a [illegible] are taken and cultures made. In these cases the organism behaves as a harmless resident; but it may become active again at any time either spontaneously or after surgical interference with the wound.

Though the hæmolytic streptococcus is often resistant to local application of sulphonamides, it has not resisted penicillin (in adequate dosage) in any of the cases under my care. This is important in view of the ease with which it can travel from case to case and the frequency with which this used to happen.

Staphylococcus aureus is the organism most commonly found on burns and surface wounds; indeed its incidence is almost 100%. During the invasive period it may cause a severe local and general reaction; and though, in established infection, it may have little or no retarding effect on epithelial growth, there is a risk, even in late cases, that a reaction may develop if the wound is disturbed surgically. The mechanical action of the pus produced by the staphylococcus is a common cause of failure of skin-grafts; if pinch or divided grafts of postage-stamp size are used about half the grafts are likely to take in the presence of this infection (Bodenham 1943). Otherwise this organism is less to be feared than the hæmolytic streptococcus. It is almost completely resistant to local application of sulphonamides in any form but is highly sensitive to penicillin.

Bacillus pyocyaneus is rarely a primary invader; it appears from about the 5th day onwards, usually in company with streptococci or staphylococci. In large surgical wards full of open wounds or burns the tendency to spread is so great that the incidence is almost 100% unless infected cases are isolated. Though it does little to retard epithelial growth, it is responsible for considerable pus production. Elimination of streptococci and staphylococci from extensive surface wounds by penicillin shows that pyocyaneus alone can induce toxæmia and pyrexia. The large quantity of pus produced may "float" skin-grafts away from the unhealed surface; but, though it has been found in about 80% of the 75 cases reviewed, skin-grafting has been freely carried out in its presence and with fair success.

Bacillus proteus, too, is rarely a primary invader. It forms pus liberally with little retardation of wound healing. Its effect on skin-grafts is similar to that of pyocyaneus. Its incidence varies greatly from one hospital to another, and at different times in the same hospital. In this unit it reached a peak of almost 80% [illegible] months of 1943 it has been [illegible]teus and pyocyaneus [illegible] and to penicillin.

Bacillus coli has seldom been isolated in this unit and has presented no problems. *Diphtheroids* are occasion[illegible] The *anaerobes* have not been [illegible] it is unlikely that they play [illegible]ese wounds, though gangrene in burns has occasionally been reported (Moroney 1941).

PREVENTIVE TREATMENT OF WOUND INFECTION

Contamination of wounds before reaching hospital can be lessened by simple measures. The following first-aid precautions are advocated for this country where transport is available and distances are short.

1. Do not remove clothes by dragging them over injured parts. They should, if necessary, be cut away from the wound. Clothes covering burns are often heat-sterilised and are better left for removal in hospital.
2. Cover the part with sterile dressings. If these are not at hand it is better to use a clean towel rather than leave the burn (or wound) exposed.
3. Transport the patient with all speed to hospital.

MANAGEMENT OF BURNS IN HOSPITAL

The following procedure has given encouraging results.

1. Rapidly assess the extent and nature of the injuries.
2. As soon as the general condition permits, gently but thoroughly clean the whole injured surface and a wide area around it with 0·75% 'Cetavlon' (ICI) (cetyl [illegible]
3. Rer[illegible] instruments, using [illegible] are intact they are better left alone. If they are damaged then they should be cut away.
4. Clean the whole area again with cetavlon.

5. Cover the injured surface with preliminary cleansing cream (Colebrook 1942) which consists of sulphonamide 3%, and cetavlon 1%, in lanette wax SX and neutral-oil base.
6. Dress with tulle-gras, gauze and cotton-wool. It is important that the dressings be carefully applied to exclude any possibility of infection entering at the edges. Bandages should be firmly applied to support the injured tissues and if possible the part should be raised to reduce œdema. The dressings must not be allowed to slip.

These dressings may be safely left for 5–7 days. But if local pain and tenderness, regional adenitis, or signs of toxæmia suggest infection they should be removed and swabs taken for culture. A temperature of 100–101° F. is usual with extensive burns and injuries, even when they remain sterile throughout; this pyrexia of injury lasts from 3 to 6 days. A rise of temperature occurring with mild injuries, or pyrexia above this limit with extensive injuries, indicates local infection.

The accepted principles of treatment—immobilisation and free drainage of the infected part—must not be overlooked. Where there is infection of extensive wounds it may be impracticable to treat it by local specific therapy. The general condition of the patient may be seriously upset by the necessary changes of dressings. For these cases the administration of a sulphonamide by mouth is advocated and injections of penicillin are envisaged when supplies become available.

About the 5th to 7th day the dressings are changed and swabs are taken. The injured surface is again cleaned with 0·75% cetavlon. The blisters are cut on the 6th day, when most of these mild burns will be healed. The areas more deeply burnt are dusted with sulphonamide powder and covered with tulle-gras, gauze and cotton-wool dressings.

Superficial burns rarely become infected under this régime. A few staphylococci and pyocyaneus may be cultured, but pus and local inflammation are absent. With deep burns a slow invasion with a low-grade infection is usual for about 3 weeks. After the first change of dressings further changes are made at intervals of 3–7 days. Separation of sloughs is assisted with forceps.

Epithelium grows across surface wounds very slowly unless the healing edge is kept clean. In the absence of infection this is simple, and the dressings are changed every 5–7 days. If infection is established, daily change of dressings is needed to maintain the best conditions for growth of epithelium.

For skin losses of more than a few square centimètres, skin-grafting greatly accelerates healing. It is particularly useful in burns, since they are on the whole larger than wounds of mechanical origin.

Ideally, infection is avoided and grafting carried out at once. This is sometimes possible in wounds of mechanical origin, and (more rarely) in deep but small burns. But infection occurs in almost all large surface wounds (Heggie and Heggie 1942) if they do not heal within a fortnight, and our object must be to prepare their granulating surfaces for skin-grafting as rapidly as possible. The problems are similar for burns and for wounds, and the same technique of dressings should be adopted. Wounds are usually tender so long as infection persists, but they are rarely tender when it is controlled.

Firm pressure helps to prevent the overgrowth of granulations. Epithelium will not grow across an uneven surface, and one must aim at uninfected flat even granulations.

SULPHONAMIDES APPLIED LOCALLY

Sulphonamides were first applied locally to wounds on a large scale in the battle casualties of 1940. Their use became widespread, and over-confidence in them often led to neglect of surgical principles. *It is now* clear that though they are an aid to wound management, they cannot replace it. Matthews (1942) has shown by bacterial counts their value in burns; they reduce the infection but do not eliminate it.

Sulphonamide-resistant strains of hæmolytic streptococci are sometimes encountered (Francis 1942). There may be *p*-aminobenzoic acid or similar antagonistic [illegible] in the pus; or the organisms may develop a resistance to sulphonamides; or they may be resistant from the start.

Against the staphylococcus the sulphonamides exert only a limited action when applied locally; the best is sulphathiazole, but in comparison with penicillin its action is slight. Infection with *B. pyocyaneus* often persists when either sulphonamides or penicillin is used.

Until the supplies of penicillin are adequate, the sulphonamides should be tried first. This has been done, with few exceptions, throughout the present series of cases.

LOCAL APPLICATION OF PENICILLIN

The penicillin has been supplied as a calcium salt in powder form (Florey 1943), the potency in Oxford units varying from 6·8 to 163 units per mg. So little penicillin is required that it was found extravagant to apply the powder undiluted to the wound. In addition it proved impossible to estimate accurately the amount applied per square centimetre. Accordingly I began to use penicillin diluted to a standard potency either (*a*) in a sterilisable powder of neutral reaction, or (*b*) in a neutral ointment base.

TABLE I—SCHEME OF LOCAL PENICILLIN THERAPY

Type of infection	*Strength*	*Applied*
1. Active intense infection; pus profuse. (After first negative swab treat as 3.)	Cream 200 units per gramme; this yields 8 units per sq. cm.	Every 24 hours
2. Established infection; pus profuse	Cream 100 u/g. (4 u/sq. cm.)	Every 24 hours
3. Established infection; pus slight or moderate	*Cream* 100 u/g. (4 u/sq. cm.) Or when dry conditions are wanted:—	Every 48 hours
	Powder mixture: 1000 u/g. applied as frosting yielding 4 u/sq. cm.	Every 24 hours

(1 g. cream lightly spread covers an area 5 × 5 cm.)

The powder mixture.—Powdered sulphanilamide was chosen as the diluent. Sulphanilamide mixed with 5% (weight for weight) light magnesium oxide can be autoclaved at 5 lb. for 20 minutes without caking. The penicillin is added, *after autoclaving, in the cold state by simply shaking the two* powders together; it mixes rapidly. Enough penicillin is used to give a strength of 1000 units per gramme of the mixed powder. When this mixture is spread on a surface as a light frost, in the same way as sulphanilamide is commonly employed, there are approximately 4 Oxford units of penicillin per sq. cm. of wound. This is the same amount as is applied when a thin layer of cream of 100 units per g. is use.

The cream.—The cream base advocated by Colebrook (Clark et al. 1943) was tried. Prepared in the manner recommended, it is satisfactory; but after autoclaving it tended to separate into oil and lanette wax. A base of soft paraffin and lanette wax with water has proved more convenient and has been used throughout. It consists of equal parts of soft paraffin, lanette wax SX, and water, mixed at 140° F. and put into capped glass jars. Each jar is only half filled. The jar, with cap on, is autoclaved at 10 lb. for 30 min. and during cooling is shaken several times. A good cream base results. Penicillin solution at a strength of 500 units per c.cm. is stirred into this to give a final strength in the cream of 100 units per g. The result is a yellow cream which is easy to spread. The stiffness can be varied by altering the water content, but the cream described above is quite satisfactory. It can be frozen solid to preserve the potency of the penicillin if it is not wanted at once.

As the base is miscible in all proportions with water the cream can be readily removed with water alone.

The powder seems to be less effective than the cream, perhaps because it rapidly dissolves in the tissue fluids and the penicillin is quickly absorbed. In the cream the *penicillin is dissolved in the water phase of the base* and finely dispersed: it is not available for immediate solution in the tissue fluids; so its action is spread over 24–48 hours.

If a wound is covered with the cream for more than a week it tends to become soggy and epithelial growth is slowed. This sogginess can be limited if the cream is spread on tulle-gras which has itself been laid on a piece of 6-inch bandage; tulle-gras and bandage are both laid

TABLE II—RESULTS

S=sulphanilamide; DD=dry dressing; Pp=plaster; M=mercurochrome; SP=soft paraffin

—	Site and area (sq. cm.)	Age of wound (days) and previous treatment	No. previous positive swabs		Frequency of application (hours)	Powder or cream (units per g.)	No. of days the swabs negative		Clinical progress
			Strep	Staph.			Strep.	Staph.	
Group I Penicillin powder	Hand (18)	47 (S)	5	5	48	P (35,000)	2	0	Healed 20 days
	Foot (15 5)	34 (S)	4	4	48	P (35,000)	2	2	Healed 30 days
	Arm (62)	60 (S)	3	3	48	P (35,000)	6	2	Trt. stopped after 2 neg swabs; infection returned
	Stump (3 5)	21 (S)	2	2	48	P (10,000)	9	3	Healed 20 days
Group II Penicillin—sulphanilamide powder (1000 units/gramme)	Arm (180)	90 (S)	2	—	24	P (1000)	2	—	Graft 60% take
	Hand (40)	6 (S)	—	1	48	P (1000)	—	10	Graft 15% take
	Leg (45)	180 (S)	2	2	24	P (1000)	7	—	Healed 25 days
	Leg (30)	90 (S)	2	2	24	P (1000)	5	—	Graft 90% take
	Face (100)	10 (S)	—	1	24	P (1000)	—	4	Healed 20 days
	Face (50)	10 (S)	—	1	24	P (1000)	—	2	Healed 18 days
	Buttock (36)	7 (S)	—	1	24	P (1000)	—	8	Graft 95% take
	Arm (9)	7 (S)	1	1	48	P (1000)	11	11	Healed 20 days
	Face (100)	10 (S)	1	—	48–72	P (1000)	25	—	Greater part healed Graft 90% take on rest
Group III Penicillin cream (120 & 100 units/ramme) every 48 hours	Stump (42)	7 (DD)	—	2	48	C (120)	—	Uncontrolled	Profuse discharge; no change
	Hand (2)	52 (S)	3	—	48	C (120)	2	—	Healed 14 days
	Abdomen (8)	21 (S)	2	2	48	C (120)	4	8	Healed 8 days
	Leg (10)	180 (S)	4	—	48	C (120)	4	—	Healed 17 days
	Leg (2)	35 (S)	3	3	48	C (120)	4	7	Healed 12 days
	Arm (60)	17 (S)	3	3	48	C (120)	6	6	Graft 90% take
	Foot (6 5)	35 (S)	—	2	48	C (120)	—	6	Healed 10 days
	Back (200)	18 (S)	—	2	48	C (120)	—	6	2nd–3rd degree burn. Healed 16 days
	Back (36)	21 (S)	2	2	48	C (120)	2	2	Graft 60% take
	Arm (120)	24 (S)	2	2	48	C (120)	7	7	Graft 90% take
	Back (130)	120 (S)	—	3	48	C (120)	—	7	Graft 95% take
	Stump (6)	14 (S)	2	2	48	C (120)	8	Uncontrolled	Sequestrum discovered later
	Stump (10)	42 (S)	2	1	48	C (120)	Uncontrolled	—	Profuse pus
	Hand (18)	10 (S)	—	1	48	C (100)	—	6	Healed 20 days
	Hand (110)	14 (S)	2	—	48	C (100)	19	—	Graft 70% take
	Hand (160)	14 (S)	2	2	48	C (100)	6	26	Graft 90% take
	Foot (36)	28 (S)	2	—	48	C (100)	6	—	Graft 90% take
	Leg (400)	120 (Pp)	4	—	48	C (100)	5	—	Patch graft 40% take; granulations fibrous
	Hand (15)	16 (S)	—	1	48	C (100)	—	2	Healed 14 days
	Hand (25)	16 (S)	2	2	48	C (100)	10	6	Healed 18 days
	Foot (30)	15 (S)	—	1	48	C (100)	—	2	Healed 11 days
	Hand (40)	6 (S)	2	1	48	C (100)	9	7	Healed 12 days
	Hand (60)	6 (S)	2	1	48	C (100)	9	7	Healed 26 days
Group IV Penicillin cream (100 units/ramme) every 24 hours	Leg (300)	72 (S)	—	4	24	C (300)	—	4	Patch graft 80% take
	Scalp (170)	28 (S)	2	3	24	C (100)	2	4	Graft 60% take
	Arm (350)	30 (S)	2	—	24	C (100)	2	—	Pinch graft 70% take
	Hand (64)	32 (S)	2	1	24	C (100)	2	—	Graft 20% take
	Leg (20)	28 (S)	1	1	24	C (100)	2	2	Healed 16 days
	Hand (20)	9 (S)	—	1	24	C (100)	—	8	Healed 14 days
	Hands (200)	21 (S)	2	2	24	C (100)	4	2	Graft 70% take
	Back (13)	56 (S)	—	2	24	C (100)	—	6	Graft failed
	Leg (300)	35 (S)	—	2	24	C (100)	—	7	Patch graft 95% take
	Leg (6 5)	100 (S)	3	3	24	C (100)	4	6	Healed slowly. Reinfection 6 days after penicillin stopped
	Stump (25)	14 (S)	—	2	24	C (100)	—	11	Healed 30 days
	Leg (10)	160 (S)	2	—	24	C (100)	—	5	Healed 20 days
	Stump (25)	60 (S)	2	2	24	C (100)	6	6	Healed except 1 × 2 cm.; later grafted
	Leg (110)	120 (DD)	2	2	24	C (100)	1	1	Healing very slow. Hæmoglobin 40%
	Leg (24)	300 (DD)	—	2	24	C (100)	—	3	Healing slowly
	Leg (2)	60 (S)	2	2	24	C (100)	5	5	Healed slowly
	Foot (13)	400 (S)	2	2	24	C (100)	5	5	Healed slowly (3 months)
	Arm, hand (250)	7 (S)	—	2	24	C (100)	—	2	Graft 60% take
	Legs (120)	10 (S)	2	2	24	C (100)	6	2	Graft 95% take
	Face (20)	18 (S)	2	—	24	C (100)	4	—	Healed 18 days
	Scalp (20)	42 (S)	1	1	24	C (100)	3	3	Graft 70% take
	Hands (60)	10 (S)	—	2	24	C (100)	—	6	Healed 20 days
	Arm (10)	49 (S)	2	—	24	C (100)	2	—	Healed 5 days
	Heel (2)	21 (S)	2	—	24	C (100)	10	—	Healed 15 days
	Leg (7)	7 (S)	1	—	24	C (100)	4	—	Healed 14 days
	Leg (230)	14 (S)	2	—	24	C (100)	8	—	Patch graft 85% take
	Leg (350)	21 (S)	—	2	24	C (100)	—	6	Patch grafts 85% take
	Arm (70)	90 (S)	1	1	24	C (100)	4	4	Graft 60% take
	Foot (2)	10 (S)	1	1	24	C (100)	4	4	Healed 7 days
	Foot (2)	60 (S)	2	2	24	C (100)	5	5	Healed 14 days
	Leg (10)	70 (S)	2	2	24	C (100)	5	5	Healed slowly, broke down (back of knee)
	Leg (20)	21 (M)	2	2	24	C (100)	2	2	Healed 14 days
	Leg (6)	7 (S)	1	—	24	C (100)	3	—	Healed 9 days
	Foot (35)	14 (DD)	2	—	24	C (100)	2	—	Graft
	Arm (180)	49 (S)	2	—	24	C (100)	2	—	Patch graft
	Thigh (25)	15 (DD)	1	—	24	C (100)	2	—	Graft 75-85%
	Arm (25)	50 (S)	1	—	24	C (100)	2	—	Healing
	Scalp (8)	49 (S)	1	1	24	C (100)	2	2	Heal
Group v nicillin cream (500 units/gramme) at intervals	Legs (1500)	28 (SP)	2	2	96	C (500)	12	11	T

on the wound surface, and excess moisture can then escape from the wound.

Factors influencing dosage are :—

(1) *Amount of surface discharge.*—Much discharge dilutes the penicillin and washes it away.

(2) *Intensity of infection.*—A higher dosage is necessary during the period of invasion.

Table I is a scheme of treatment showing the minimum strength recommended and the minimum frequency of application.

Swabs should be taken away every 48 hours and skin-grafting should not be attempted until at least three consecutive swabs are negative.

The use of special treatment charts is advisable to simplify correlation of data. In all cases the following particulars were entered :

Name : Rank : Batch No :
No : Unit :
Description & size of wound :
Synopsis of previous treatment :
Cause of wound :
Organisms present :
Age of wound on commencing this treatment :
Surface discharge type :

Date of applications and/or swab cultures	H. Streps.	H. Staphs.	B. Pyo-cyaneus	B. Proteus	PROGRESS		
					Penicillin—form of application	Approx. units used	Remarks including any general reaction to infection

RESULTS OF PENICILLIN TREATMENT

Table II gives a synopsis of the results.

In *group* I the powdered calcium salt of penicillin, applied every 48 hours, was found to eliminate streptococci and staphylococci from burns and surface wounds. None resisted adequate doses of penicillin, though many had been clinically resistant to sulphonamides. In practice so little powder was required that it was difficult to avoid wasteful excess.

In *group* II the cases were treated with penicillin mixed with sterilised sulphanilamide powder to a strength of 1000 units per gramme. This proved effective when applied as a light frosting every 24 hours. All powder preparations are liable to cause pain, though this does not last long and is rarely so bad that treatment has to be stopped.

In *group* III the cases were treated every 48 hours with cream containing 100 units per gramme. The results were more consistently satisfactory than those obtained with the powder. One case of streptococcal infection and two cases of staphylococcal infection remained uncontrolled after a fortnight's treatment. The response of the streptococci compares favourably with that reported by Clark et al. (1943). No comparable series of staphylococcal infections treated with penicillin has been reported.

In *group* IV the cream was applied every 24 hours and gave even better results. There were no failures.

Recurrence of infection.—Staphylococci usually reappear in cultures from the wound 5–7 days after penicillin treatment ceases. Streptococci reappear later and less often.

Sloughs.—Penicillin can deal with coccal infection in the presence of sloughs, but not if they cover the whole surface of the wound.

PENICILLIN AND SKIN-GRAFTING

The early removal of coccal infection reduces the delay before skin-grafting can be undertaken with good prospect of success. So many factors affect the take of grafts that figures must be very unreliable, but it can be safely said that results in this unit have improved since penicillin has been used.

Penicillin powder has been applied under grafts on [illegible]ted surfaces as a prophylactic measure in 15 [illegible] No adverse effect on the percentage take was observed, and the method should prove valuable in the immediate grafting of wounds.

Preparation of surfaces.—Infected granulations show considerable improvement after penicillin treatment. In the absence of firm support, however, they tend to become œdematous and exuberant. They should be flat, smooth, and delicate, bleeding easily but not spontaneously, bright in colour and delicate in texture. These qualities are attained by control of infection combined with firm pressure. A last dressing of dry close-mesh gauze, applied 12 hours before operation with the firmest pressure that can be tolerated, together with elevation of the part, produces a good surface for grafting. If the granulations are old, it is useful to freshen the relatively avascular surface by curettage.

The tissue tolerance for penicillin is high, and in no case have either local or constitutional ill effects been attributable to its use. In early cases a particularly delicate velvety type of granulation is produced. Discharge is slight and mucoid. This is in marked contrast to the appearance of the granulations after the continued use of eusol and proflavine powder. Here the granulations are hard, tough and of the " coconut matting " type; skin-grafts take poorly and epithelium advances but slowly over the surfaces.

SUMMARY AND CONCLUSIONS

In first-aid for burns more care should be taken to prevent contamination.

Penicillin is more active than the sulphonamides in eliminating streptococci and staphylococci from burns and surface wounds. It removes streptococci which are resistant to sulphonamides.

Penicillin does not affect *B. proteus*, nor (in concentrations lethal to gram-positive cocci) *B. pyocyaneus*.

A cream base, formed with lanette wax and soft paraffin, and giving a concentration of 100 Oxford units per gramme, is the most effective and economical means of applying penicillin to burns and surface wounds. Applied every 24 hours it will usually remove gram-positive cocci from an infected raw surface within 4–6 days. Wounds tend, however, to become soggy after it has been employed for a week or more.

Where the surface exudate from a wound is only slight, or dry conditions are desired, a penicillin-sulphanilamide powder is suitable.

Penicillin in strengths up to 20 units per sq. cm. has no adverse effect on skin-grafts. Its use facilitates grafting of raw surfaces.

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DETERMINING BLOOD-UREA CLEARANCE.—Knowing the volume of urine in c.cm. per minute, the blood-urea per 100 c.cm. of blood, and the urea concentration per 100 c cm of urine, one can with the aid of a formula and some arithmetic calculate the blood-urea clearance as a percentage of the normal value. For those who dislike the arithmetic, or distrust their ability in such sums, Morris C. Davis, MD, and Mildred Barnard, MA, have constructed a monograph (W. Ramsay, Melbourne, 6*d.*), with the aid of which and a ruler the clearance value can be readily reached. Proceeds from its sale are to go to the Alfred Hospital Clinical Fund for Students.

MODERN (NON-VOLATILE) ANÆSTHESIA

OBSERVATIONS ON 1000 CASES

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COMFORT and rapid convalescence for the patient should always be, after safety, the anæsthetist's major care. Until the last 15 years little progress had been made in anæsthesia in perfecting less toxic drugs or devising better apparatus. The strides made recently, however, in both these directions have been enormous, enabling the modern anæsthetist to offer his surgeon a high degree of comfort for his patient, an increased margin of safety, and widened surgical scope. Comfort for the patient facing what is for him a severe ordeal seems to have be [illegible] t by the anæsthetist, who [illegible] ng from the early days of [illegible] rendered unconscious was [illegible] that the induction of ana [illegible] horrible nightmare to all but the most insensitive, and recovery often be accompanied by nausea, sickness and physical misery inevitably prolonging convalescence; and furthermore that these evils are *necessary* to assure the patient's safety.

OBJECTIONS TO CHLOROFORM AND ETHER

The chief offenders against the patient's comfort and rapid convalescence are chloroform and ether—but are methods employing these and other volatile agents fer or even as safe as more modern ones? Chloroform *fortunately now almost universally recognised as being* o poisonous for the production of surgical anæsthesia human beings, after much bitter experience, particularly of death on the table.[1] Ether still seems be a stumbling block because, having a wide margin of safety (*during administration only*, be it noted), is the easiest to administer from the point of view getting the patient off the table alive, and in pparently fair condition; that seems to have been the næsthetist's chief criterion of success. Thus ether's ntribution to postoperative mortality has gone largely nperceived, *owing to the anæsthetist's custom of* lieving his mind of all further responsibility once the atient was out of the theatre. If the anæsthetist of day expects to be entitled "specialist" he must llow up his patients and assume his share of responsibility for their postoperative condition. Ether's eceptive reputation for safety will then become plain. Vhen a patient dies of chloroform poisoning there is ften a dramatic exitus on the table; but consider iddle-aged patients undergoing major surgery, or hocked casualties. How many of these, despite firstlass surgery and nursing, just fail to survive, dying of o-called "postoperative shock" after a long etherisation?

I contend that ether, though for many years the best nd safest drug at our command, must now be classed as either; *nor does it produce the best results either for* he patient's comfort or his rapid convalescence, in time f war a paramount consideration. In my view, therefore, ether is now best avoided wherever possible and n future should be eliminated altogether from our tech [illegible] s concerning the toxi and [illegible] are quoted to suppor these [illegible] causes:

(1) Cardiac dilatation, weakened contractions,[2] myocardial relaxation,[3] and peripheral vasodilatation,[4] consequently ultimately lowering blood-pressure.[5]

(2) In patients in shock, further profound depression of the cardiovascular system by paresis and increased permeability of capillaries[6] (fig. 1, charts A and B; cf. charts A and B in fig. 2).

(3) Destruction of red cells, reduction of Hb up to 10%.[6]

(4) Paresis of entire gastro-intestinal tract, resulting often in considerable discomfort from "gas pains," and not rarely in acute dilatation of the stomach or paralytic ileus.[7, 8]

(5) Albuminuria, "often with casts," in 25% of cases.[9]

(6) Considerable increase in H-ion concentration, hyperglycæmia and "acidosis."[10]

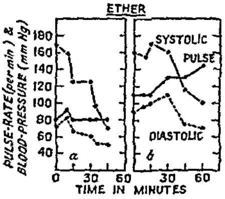
Cushny[11] *has compared the cardiac dangers of chloroform and the respiratory dangers of ether on level terms* as regards ultimate morbidity and mortality. Other observers[12] have shown that shock and death after intestinal manipulation in dogs occurred most rapidly after ether out of a number of anæsthetics (including 'Pentothal') used.

Experience during the first world war showed that 90% of the wounded who underwent amputation through the thigh in CCSs died after chloroform and/or ether anæsthesias, whereas such operations could be carried out at Base with comparatively low mortality.[13] It appears to be in the former circumstances that the use of ether has been so strongly advocated owing to its portability and ease of administration, whereas in the latter, improved facilities (thanks to the efficiency of modern drugs and apparatus) render its use largely unnecessary and mortality can thus be further reduced.[14] Kaye[15] [illegible] ether. Neither comfort nor convalescence are favoured by these sequelæ.

ADVANTAGES OF MODERN DRUGS

The intelligent use of modern drugs and apparatus can greatly improve the comfort and accelerate the recovery of postoperative patients. Increased safety in bad risks has already been demonstrated in a previous paper,[14] giving statistics of military casualties arriving from France, severely exhausted, many with gas gangrene and most without previous treatment. In the seriously wounded the mortality among those etherised was 18%; among the others it was nil.

Nitrous oxide is almost the earliest and certainly the weakest anæsthetic—but how transformed are its capabilities by modern apparatus and methods of premedication! Almost universally acknowledged as per se the least harmful agent known, having no perceptible effects on the body,[18, 19] only by unjustifiable efforts to reinforce its power with anoxia can it damage the patient[19, 20]; this is never necessary if it is supplemented by pentothal when an abundance of oxygen can be employed. Pentothal is also almost entirely



g. 1—(a) Prostatectomy; fair condition; aged 72. Pentothal 0·3 g. with N_2O-O_2 and ether 3½ oz. Boyle machine. (b) Laparotomy for subhepatic abscess; fair condition; aged 49. N_2O-O_2 (induction) with ether 8 oz. and O_2 (maintenance). Oxford Vaporiser.

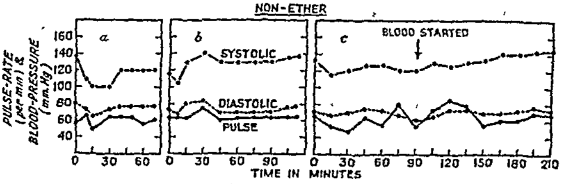


Fig. 2—(a) Prostatectomy; poo [illegible] and N_2O-O_2. Boyle machin [illegible] fair condition; aged 49. [illegible] machine. (c) Laminectomy [illegible] Pentothal 0·5 g. with Intratr [illegible]

non-toxic.[21] These two agents, allied or separately, can cover almost the whole field of extra-abdominal surgery as well as much abdominal work.

Experience of large numbers of air-raid casualties has repeatedly shown that pentothal-O_2, or with N_2O and high O_2 content (30–50%) is outstandingly successful. Many other anæsthetists have expressed the same opinion. This combination, supplemented further with cyclopropane (*after* N_2O *probably the least toxic of all* inhalation anæsthetics) further widens the field which can be covered. Finally these agents can be combined with the percaine spinal technique of Wilson [22] to produce abdominal relaxation incomparably better than anything obtainable with the deepest soaking in chloroform and ether, and with far less formidable after-effects. This combined technique, first described by Jarman,[23] almost entirely eliminates the disadvantages of unsupplemented spinals. Furthermore, in severe operations an unrivalled degree of protection from the effects of neurogenic [24] and psychic [25] shock is achieved.

The following is a summary of the routine techniques used to the total exclusion of chloroform, ether and the volatile agents generally.

(1) Intravenous pentothal, single dose, or "continuous" with the highly efficient apparatus of Macintosh and Pask.[26]

(2) Pentothal induction followed by N_2O-O_2, supplemented if necessary with small additional injections of pentothal or cyclopropane; with or without intubation.

(3) Pentothal induction followed by percaine spinal (or field block if spinal contra-indicated) and N_2O-O_2.

Pentothal makes induction entirely pleasant; true contra-indication is almost non-existent. In children of an age to fear venepuncture [27] rectal methods are substituted.

These sequences alone are sufficient for any anæsthesia problem, given patience in evolving techniques and a strong enough desire to improve the results of anæsthesia. The satisfactory results obtainable are seen in fig. 2.

Finally there is the question of "frontline" and "blitz" anæsthesia. For situations where bulky machines are impracticable, open mask anæsthesia has been much advocated. We have seen what a terrible mortality that can entail.[13] It is therefore strongly urged that pentothal is the safest, speediest and most portable way of avoiding it. Woolmer [28] demonstrates its applicability and Jarman's pentothal case [13] proves it. One such case was in constant service on mobile unit work around London in the raids, and, compactly slung on the shoulder, made one entirely independent of other apparatus. Cyclopropane outfits can also be made sufficiently light and portable.

The protagonists of ether say that these methods are too dangerous for the non-specialist. Considerable experience with student assistants all through the crowded "Dunkirk time" has convinced me that any well-trained young medical man who may be called on for anæsthetics in this war can acquire sufficient skill, with a few weeks intensive training, in the methods outlined to be a much "safer" anæsthetist (having regard to the long view of mortality, not just the "get-'em-off-the-table-alive" outlook) than if left to struggle along with the older drugs and methods. Particularly if the specialist is not always available should his substitute be skilled in the use of drugs and methods least harmful to the patient.

TABLE I—IMMEDIATE POSTOPERATIVE CONDITION IN 1000 CASES

Condition	Shortest time	Within 1 hr.	Longest time	Average time
Recovery of consciousness	Close of opn. (40%)	70%	7 hr.†	50 min.
Able to take fluids by mouth*	5 min.	50%	12 hr.†	2 hr.

* Excluding gut operations on special feeds.
† Including all severely shocked patients.

No-one contemplating patients returned to the wards after surgery can fail to be impressed with the difference between the etherised and the non-etherised. The former often come back snoring, sweating and gurgling, [illegible] relaxed hypotonic muscular system which results in poor circulating blood volume, reduced cardiac output and stagnant anoxia; after a long period of such coma they return to consciousness to vomit repeatedly and exhaustingly (further depleting their body fluids), and remain miserable for hours or possibly days. The latter usually return quiet, warm and dry; often fully conscious, with good tone in muscles and cardiovascular system, are rarely even nauseated and commonly taking fluids within the hour—not vomiting them. Which of these is more likely to have the greater comfort, the quicker convalescence, and (in the more serious cases) the better prognosis?

FIGURES IN 1000 CASES

Observations have been made on 1000 unselected cases of all types of general surgery, acute and "cold," in which *no volatile anæsthetic agent* was used. Some 220 of these cases were done with the American Hospital in Britain, and include many shock-producing procedures such as laminectomies, cup-arthroplasties of hip, and hip-joint excisions, often on poor-risk patients; 10% of these cases were transfused. The rest were done in EMS hospitals and include a fair proportion of severe casualties. The abdominal series includes acute emergencies as well as gastrectomies, splenectomies, &c. I doubt whether any methods employing volatile anæsthetics could show comparable results. An attempt was in fact made at the start of this study to run a parallel series of cases by colleagues using volatile anæsthetics. This however broke down owing to paucity of coöperation in completing cards by those using chloroform and ether.

TABLE II—POSTOPERATIVE PULMONARY COMPLICATIONS IN 1000 CASES

Normal respiratory tracts before operation (831 *cases*)

Complication	General cases (661)	Abdominal cases (170)	Total
Slight bronchitis ..	1 (0·15%)	2 (1·2%)	3 (0·36%)
Severe bronchitis ..	Nil	Nil	Nil
Pneumonia ..	1 (0·15%)	Nil	1 (0·12%)
Atelectasis	1 (0·15%)	1 (0·6%)	2 (0·24%)
Total morbidity..	3 (0·45%)	3 (1·8%)	6 (0·72%)

Pathological respiratory tracts before operation (169 *cases*)

Complication	General cases (112)			Abdominal cases (57)		
	No. of pts.	Worse	Further comp.	No. of pts.	Worse	Further comp.
Upper resp. infec.	52	Nil	Nil	20	2	Pneum.
Bronchitis ..	42	Nil	Nil	28	4	Nil
Asthma	2	Nil	Nil	2	1	Nil
Hypostasis ..	7	Nil	Nil	3	Nil	Nil
Tuberculosis ..	8	1	Hæmop.	3	Nil	Nil
Collapsed lobe; fluid	1	Nil	Nil	1	Nil	Nil

A further attempt to compare these modern non-volatile methods with modern methods of administering ether, by employing the latest ether apparatus, the Oxford Vaporiser, had to be abandoned after 18 cases at the generally expressed desire of the surgeons concerned, because the patients' postoperative condition became so much less favourable. This did not surprise one in view of the opinion recently stated by Bannister [30] that "a careful follow-up of cases . . . in the Radcliffe Infirmary, Oxford, has failed to show any difference between ether anæsthesia from the Oxford Vaporiser and ether anæsthesia by other means."

In the 773 general surgical cases the duration of operation ranged from 5 min. to 4¼ hr., with an average of 48 min.; 308 were over ¾ hr. In the 227 abdominal cases duration ranged from 15 min. to 3 hr.; average 54 min.; 118 were over ¾ hr. As regards postoperative vomiting, including cases which had been vomiting before operation, only 20% of the patients had any

TABLE III—COMPARATIVE TABLE OF TOTAL POSTOPERATIVE MORBIDITY AND MORTALITY

ABDOMINAL CASES			ALL TYPES OF CASE		
Complication	Gas-chloroform-ether series*	Modern anæsthesia series	Complication	Gas-chloroform-ether series*	Modern anæsthesia series
	%	%		%	%
Slight bronchitis	5·6	0·88	Slight bronchitis	5·9	0·3
Severe bronchitis	3·0	Nil	Severe bronchitis	2·5	Nil
Pneumonia	1·1	0·88	Pneumonia	0·99	0·3
Atelectasis	2·3	0·44	Atelectasis	1·39	0·2
Total pul. morbidity	12·0	2·20	Total pul. morbidity	11·9	0·8
Total pul. mortality	1·1	Nil	Total pul. mortality	0·7	Nil

* From tables published by Dawkins.[29]

There were two deaths within three days, both in moribund patients.

Male, aged 68. Fractured skull, ribs, clavicle, compound tibia; severe shock. Died, 24 hr. Cerebral compression, fractured base of skull at PM.

Male, aged 27. Right buttock, hip, thigh, leg, arm, completely pulped. Lacerated face. Profound shock. Died, 24 hr. Irreversible shock.

vomiting at all; of these 6% vomited once, 5% twice, 4% thrice and 5% more than thrice; 8·5% patients after spinals had moderate headache relieved by 'Veganin'; no true spinal headaches occurred. Of the 18 patients anæsthetised with the Oxford Vaporiser, 9 vomited, 3 once, 1 twice, 2 thrice and 3 more than thrice.

The immediate postoperative condition of the 1000 patients is summarised in table I. In the small Oxford Vaporiser series, where none of the patients was shocked or seriously ill before operation, the shortest time to recover consciousness was 15 min.; 6 of the 18 cases recovered within an hour; the longest time was 5 hr. and the average 2 hr. 7 min. One of these patients could take fluids by mouth after 30 min.; 3 within an hour; the longest time was 7½ hr. and the average 3 hr. 40 min.

The postoperative pulmonary complications are set out in table II, and the incidence is compared in table III with figures published by Dawkins from the Middlesex Hospital. In the 18 Oxford Vaporiser cases, though all had normal respiratory systems before operation, there was 1 case of slight bronchitis, 1 of interlobar empyema and 1 of bronchopneumonia.

SUMMARY

The patient's comfort and rapid convalescence, which should be the anæsthetist's major care after safety, have been largely neglected until lately. Many anæsthetists have thought that the only way to safety lies in adhering to the old and uncomfortable ways.

Chloroform and ether are the chief offenders against the patient's comfort, and it is unsound to judge their safety without following the patient's progress after leaving the theatre.

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Nitrous oxide, pentothal an
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needed, can cover the whole
air-raid and front-line work.

Inexperienced anæsthetists can acquire sufficient skill to be much safer with these modern methods than if they use chloroform or ether.

In 1000 cases anæsthetised by modern non-volatile drugs the incidence of postoperative vomiting was only 20%, and the total postoperative pulmonary morbidity was 0·8%, compared with 11·9% in a comparable gas-chloroform-ether series.

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(References at foot of opposite column)

LOBAR PNEUMONIA

TREATED WITH SULPHAMEZATHINE AND SULPHADIAZINE

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R. WYLIE-SMITH, M D CAM
ASSISTANT MEDICAL SUPERINTENDENT OF THE HOSPITAL

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substance in an alkaline medium (Gilligan et al. 1943 Rose et al. 1943). To overcome this disadvantage, Rose and his colleagues, by introducing two methyl groups into the pyrimidine ring, prepared sulphamezathine (the 4:6-dimethylpyrimidine compound of sulphanilamide) and have reported on its chemistry and pharmacology. This substance and its ace
mately four times as solubl
pounds of sulphadiazine.
absorbed from the intestina
dosage the concentration in the blood can be well maintained at 5–10 mg. per 100 c.cm. Preliminary clinical trials by Macartney and others (1942) suggested that it was of high therapeutic efficiency and low toxicity. Jennings and Patterson (1942) and Peters and Easby (1943) have also reported favourably on it.

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TABLE I—CASE-MORTALITY IN RELATION TO AGE

Age (yr.)	Sulphapyridine		Sulphadiazine		Sulphamezathine
	Cases	Deaths	Cases	Deaths	Cases (no deaths)
0– 9	2	.. ..	..	..	..
10–19	61	.. ..	16	..	12
20–29	78	5 (6·4 %)	13	..	10
30–39	65	3 (4·6 %)	9	..	15
40–49	55	10 (18 %)	14	..	17
50–59	39	9 (23 %)	7	..	7
60–69	37	9 (24·5 %)	6	..	6
70–79	16	7 (43 %)	3	1	1
80–89	1	1 (100 %)	1	1	..

PRESENT INVESTIGATION

In this investigation an attempt was made to compare the efficacy and toxicity of sulphamezathine and sulphadiazine by treating in order of admission alternate cases of a series of 137 patients suffering from lobar pneumonia with either of the drugs, and to contrast the results obtained with 354 cases treated with sulphapyridine.

The diagnosis of lobar pneumonia was based on the history of the illness and physical examination, and on radiological examination carried out within twelve hours of admission and at weekly intervals thereafter. Before the beginning of treatment blood was obtained for culture and hæmatological examination, sputum was examined bacteriologically to confirm the predominance of pneumococci, and where possible the organism was typed. Only cases of true lobar pneumonia are included in this series. All cases of bronchopneumonia and atypical pneumonia, and cases showing a mixed flora on sputum examination, have been excluded.

The routine treatment in the case of all three drugs was essentially the same—administration of 4 g. of the drug, followed by 1 g. four-hourly. In the case of sulphamezathine and sulphadiazine the maximum total dose was 20–25 g. In the sulphapyridine cases a similar dosage was given, but a few cases received as much as 35 g. In addition to the usual symptomatic and nursing treatment, care was taken to ensure a large fluid intake.

In all cases radiological examination was carried out weekly, in an attempt to determine the time required for resolution of the pneumonic process, as judged by the disappearance of opacity in the lung. It was found that clinical recovery was seldom associated with a parallel disappearance of radiological signs, for the X-ray picture may be grossly abnormal two or more weeks after apparent recovery. In most cases however opacity in the lung fields had largely disappeared by 21 days, and persistence of lung shadows for a significantly longer period has therefore been regarded as evidence of delayed resolution. No account was taken of enlargement of hilar glands, which may persist for some time after the lungs have regained their translucency.

TABLE II—INCIDENCE OF TOXIC MANIFESTATIONS

Sp = Sulphapyridine; Sd = Sulphadiazine; Sm = Sulphamezathine

Drug	No of cases	Agranulocytosis	Jaundice	Oliguria	Cyanosis	Vomiting	Headache or confusion	Rash	Fever
		No & %	No & %	No. & %	No & %	No. & %	No & %	No & %	No & %
Sp	354	1 (0·2)	3 (0·8)	5 (1·4)	14 (3·9)	129 (36)	23 (6·5)	9 (2·5)	2 (0·5)
Sd	69	..	..	1 (1·4)	1 (1·4)	1 (1·4)	..	1 (1·4)	1 (1·4)
Sm	68	..	..	..	1 (1·4)	..	1 (1·4)	1 (1·4)	1 (1·4)

RESULTS

The relation of age to case-mortality is set out in table I, the incidence of toxic effects in table II and the incidence of complications and sequelæ in table III.

Sulphadiazine.—Of 69 cases treated with this drug, 12 were suffering from some pre-existing general disease which might have been expected to affect adversely the outcome of the pneumonia. There were 2 deaths; 3 cases showed bacteræmia on blood-culture. The average time required for the temperature to become normal in the 67 cases which recovered was 35 hours; 2 cases failed to respond to treatment.

Sulphamezathine.—Of 68 cases treated with this substance, 5 were suffering from a pre-existing disease. There were no deaths in this series and no bacteræmic cases. The average time required for the temperature to reach normal was 43 hours; 1 case failed to respond to treatment. In 2 cases the pneumonic process recurred after initial recovery, and in both the condition responded rapidly to further treatment with sulphamezathine. Four cases showed toxic effects; there was no case of oliguria or hæmaturia, and no vomiting or nausea. One patient developed transient but well-marked cyanosis due to methæmoglobinæmia.

TABLE III—INCIDENCE OF COMPLICATIONS AND SEQUELÆ

—	Sulphapyridine (354 cases)	Sulphadiazine (69 cases)	Sulphamezathine (68 cases)
	No. & %	No. & %	No. & %
Failed to respond to treatment	13 (3·6)	2 (2·8)	1 (1·4)
Empyema	9 (2·5)	2 (2·8)	2 (2·9)
Recurrence of pneumonia	2 (0·5)	.. ..	2 (2·9)
Pleural effusion* ..	23 (6·4)	15 (21·5)	10 (14·8)
Delayed resolution ..	27 (7·6)	5 (7·2)	6 (8·7)

* Sufficient to produce well-marked clinical and radiological signs and to require aspiration

Sulphapyridine.—The results obtained with sulphapyridine, in spite of the difference in total numbers, present some interesting comparisons with those obtained with the newer compounds. Of 354 cases, 310 recovered, giving a case-mortality of 12·4 %. Twenty-five cases were suffering from pre-existing disease. Of the 44 fatal cases, 16 died either before treatment could be adequately instituted or from some pre-existing condition unrelated to the pneumonic process during convalescence, so that the corrected case-mortality is 7·9 %. Twenty-one cases gave positive blood-cultures on admission, and one of these died. The average time required for the fever to subside was 29 hours.

DISCUSSION

As will be seen from the tables, there can be little doubt about the effectiveness of sulphamezathine in the treatment of lobar pneumonia. In the present series the death-rate was lower with sulphamezathine and sulphadiazine than with sulphapyridine. The difference in total numbers in the two series must be taken into account. It seems clear, however, that sulphamezathine is at least as effective as sulphadiazine and sulphapyridine. There was no very marked difference in the incidence of sequelæ, such as empyema and delayed resolution, between the cases treated with the three drugs, except that the incidence of pleural effusion is higher in cases receiving sulphamezathine and sulphadiazine.

Toxic effects from sulphapyridine are of course common, but they are rare with sulphamezathine and sulphadiazine. Of particular interest is the absence of gastro-intestinal symptoms and oliguria where sulphamezathine is used.

One of the cases treated with sulphamezathine showed well-marked cyanosis, due to methæmoglobinæmia. This is not surprising, because with careful spectroscopic examination of the blood it was found that methæmoglobin could be detected in many of the cases treated with sulphamezathine or sulphadiazine, although the degree of the methæmoglobinæmia was not sufficient to produce clinically remarkable cyanosis. Further, if either of these substances is administered along with confection of sulphur, sulphæmoglobin will be formed; so that, while the tendency of sulphamezathine and sulphadiazine to alter hæmoglobin is less than that of sulphapyridine, it is not entirely absent.

Two additional points of general clinical interest emerged. It was noted that in cases which recovered from pneumonia to develop empyema later, defervescence was slow; the average time for the fever to subside in such cases was 60 hours. As already stated, the radiographic signs of the lung lesion outlast the other clinical signs of pneumonia by some 1 or 2 weeks, and, in seeking for factors which might be correlated with the time of resolution, it was found that this had no relation to the duration of illness before treatment, the extent of the lung lesion, the apparent severity of the illness, or the total dose of chemotherapeutic agent employed. The incidence of this complication does however bear some relation to the age of the patient. Of 38 patients in which the pneumonia resolved slowly, 27 were over the age of 40.

SUMMARY

The results obtained by treating alternate members of a series of 137 cases of lobar pneumonia with sulphamezathine and sulphadiazine are compared with those in 354 cases treated seriatim with sulphapyridine.

The curative effect of sulphamezathine, as judged by case-mortality, is at least equal to that of sulphadiazine, and both drugs [illegible] apyridin

In cases trea [illegible] d sulph diazine, the tim [illegible] to retu to normal after the beginning of treatment is about t same, but is longer than in cases treated with sulph pyridine.

The incidence of toxic effects in cases treated wit sulphamezathine and sulphadiazine was low—6% wit sulphamezathine and 7% with sulphadiazine, as again 52% with sulphapyridine. Oliguria and gastro-intestin disturbance were not seen in the cases treated wit sulphamezathine.

In the incidence of sequelæ, there is little differen between these three drugs, except that with sulph diazine and sulphamezathine pleural effusion durir convalescence has been more frequent.

Delayed resolution is commonest in patients over 4 and a long period of defervescence is often followed b empyema.

We wish to thank Dr. H. J. Rae, medical officer of heal for Aberdeen and Aberdeenshire, for permission to publi these cases.

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Medical Societies

SOCIETY OF MEDICAL OFFICERS OF HEALTH

At a meeting of the Fever Group on Nov. 10, with Dr. ANDREW TOPPING in the chair, a discussion on

Hæmatology in the Infectious Diseases

was opened by Dr. G. W. GOODHART (LCC Pathological Service), who said that one o [illegible] blood-counts in differential [illegible] varies with the stage of t [illegible] difficult to determine exact [illegible] morph leucocytosis [illegible] in coccal diseases, [illegible] tend at that stage to produce a leucopenia or a lymphocytic response. In scarlet fever a polymorph leucocytosis persists usually [illegible] fever. The [illegible] importance [illegible] ment of mo [illegible] leucopenia [illegible] in clinicall [illegible] sometimes [illegible] clinically probable but lacks bacteriological proof. Insufficient attention is paid nowadays to the characteristic absence of eosinophil cells in the leucopenia of typhoid fever. Leucopenia is not so constant in paratyphoid fever, and Dr. Goodhart has seen several mild cases in which there was a persistent polymorph leucocytosis. The blood-pictures in measles and rubella are roughly the same. With the appearance of the rash there is leucopenia with [illegible] hich often becomes an absolu [illegible] sing lymphocyte count. In [illegible] cells often appear in except [illegible] be more helpful in differentiating rubella from scarlet fever than from measles since they are sometimes increased in measles also. Leucopenia with relative increase in lymphocytes occurs in mumps and could be used in differential diagnosis from septic adenitis where there is a polymorph response. It also helps to prevent confusion with glandular fever, though the rarer forms of this disease do show a leucopenia, distinguishable from mumps by the presence of atypical monocytes in stained films. Whooping-cough differs from othe infectious diseases in raising the total white-cell coun by increasing the lymphocytes. This change is foun in the catarrhal stage before the whoop develops and ma help the doctor to isolate contacts early. Lympho cytosis reaches its peak in the paroxysmal stage. Car is ne [illegible] rly in th lower [illegible] childhoo can [illegible] athologica proce [illegible] eat stres on figures below 20,000 per c.mm. except perhaps i adults and older children; even then he demands a hig [illegible] the clinical picture i [illegible] high total counts wit [illegible] s are not uncommo [illegible] recent case of whooping [illegible] 105,000 leucocytes pe [illegible] ymorphs and only 12% lymphocytes. He felt it was unwise to talk too glibl of characteristic blood-counts in various fevers sinc many cases run a complete course without a greate change in the blood-picture than can be paralleled in healthy people. In convalescence anæmia should be estimated by blood-counts rather than on clinical appearances, which may often mislead in children. The blood-picture in the common infectious diseases needs further investigation, but the knowledge to be gained from a count should be weighed against possible emotional trauma in small children. Facilities for these and other investigations are deficient in most fever hospitals at present but there will doubtless be improvement in the future. It is a delusion to assume that anyone can do a blood-count: accurate results demand a technique only acquired by careful training, attention to detail and constant practice.

Dr. IAN TAYLOR (LCC) pointed out the difficulty of interpreting minor [illegible] in the absence of [illegible] various age-group. [illegible] noted that in enteric fever with a respiratory onset there is sometimes a polymorph leucocytosis rather than a leucopen [illegible] that leu [illegible] than in [illegible] felt that [illegible] infection [illegible] anginose type of glandular fever.—Dr. ROBERT CRUICKSHANK (LCC) supported this but pointed out that, since many of these cases have received antitoxin, a positive Paul-Bunnell reaction could not be accepted without further investigation. He wondered what is the significnce of eosinophilia in scarlet fever and whether it can be correlated with the allergic concept of scarlatinal nephritis. He had found a leucopenia with monocytosis in a number of typhus cases and thought this blood-icture might prove useful for early diagnosis.—Dr. C. B. ROSHER (LCC) described an investigation of 25 children, average age 9 years, suffering from acute catarrhal jaundice where the dominant picture was neutropenia.

SULPHONAMIDES

Dr. B. BARLING (LCC) said that cyanosis during sulphonamide therapy is commoner with sulphanilamide than with the later preparations. It can be cured in 5–30 minutes by intravenous administration of 10 c.cm. of a 1% solution of methylene-blue, or in 3–4 hours by giving methylene-blue by mouth. Thionin stain can be used in the same way. Cyanosis cannot invariably be demonstrated as due to methæmoglobin or sulphæmoglobin and many interesting explanations have been offered, but the complication is clinically of no great moment. A minor degree of anæmia is common during sulphonamide therapy but is more often due to the disease than the drug. Nevertheless, patients in the onvalescent stage of disease after sulphonamide therapy often benefit from iron. Acute hæmolytic anæmia is a rare but dangerous complication of sulphonamide herapy. Symptoms are startling in their gravity and speed of onset. In one child he had observed the hæmoglobin fall from 90% to 30% in less than 36 hours, and red cells may be reduced to 2 million or less in an equal time. Treatment is to stop the drug. encourage free excretion by liberal fluids with alkalis and—once it is established that the kidneys are functioning well—to give blood-transfusions of the correct group and Rh factor, remembering that a pint of blood raises the hæmoglobin by about 9% in an adult male and over twice that amount in children. He gives double-strength blood whenever large transfusions are required and further transfusions may be necessary. because hæmolysis continues sometimes after the drug has been stopped. Aplastic anæmia is fortunately a rare complication; rapidly progressive anæmia with purpura and exhaustion is accompanied by reduction in red cells, white cells and platelets in the circulation and bone-marrow. The prognosis is invariably grave, but rapid elimination of the drug, repeated transfusions and 'Pentnucleotide' offer the best prospect of recovery. Thrombocytopenia had been recorded in America in only 12 cases during sulphonamide therapy, whereas about 15,000,000 people in that country are estimated to have been treated already with sulphonamides. Serious reduction in platelets can be caused by other drugs, and is a well-known complication of the chronic 'Sedormid' habit. Short of these rare cases some reduction in platelets usually occurs during sulphonamide treatment, and there may also be a slight fall in leucocytes. Agranulocytosis rarely appears until comparatively large doses of the drug have been consumed over a long period; it has been recorded after all the common sulphonamides including, surprisingly, sulphasuxidine. Agranulocytosis is perhaps the commonest of the rarer blood changes during sulphonamide therapy and about half the patients developing it die. Dr. Barling agreed with other speakers that though pentnucleotide should be given its effects are doubtful. Vitamin K is synthesised by the intestinal flora, and since this is disturbed or inhibited by sulphaguanidine some lengthening of clotting-time might be expected, and has in fact been observed in animals, during the use of the drug. At the same time their growth is slowed. By giving *p*-aminobenzoic acid or liver extract clotting-time and rate of growth are restored, while vitamin K corrects the hypoprothrombinæmia but not the growth-rate. In view of this work it has been suggested that vitamin K or liver extract should be given during sulphaguanidine and perhaps sulphasuxidine therapy to lessen the risk of hypoprothrombinæmia.

Dr. WILLIAM GUNN (LCC) said that nicotinic acid as well as pentnucleotide is of rather doubtful benefit in agranulocytosis. He felt that repeated blood-transfusion is the most hopeful treatment.—Dr. W. H. KELLEHER (LCC) described a child of one year who had been given a total of 70 g. of sulphaguanidine (15 g. daily) without any toxic effects.—Dr. E. N. ALLOTT (LCC) held that sulphasuxidine may be more readily absorbed than is usually thought, since blood sulphathiazole levels of 5–6 mg. per 100 c.cm. have been noted after its use. Similarly in some cases over 50% of sulphaguanidine has been found excreted in the urine.

Reviews of Books

Genetics of the Mouse

HANS GRÜNEBERG, Dr phil, Dr med, Moseley research student, Royal Society. (Cambridge Univ. Press. Pp. 412. 30*s*.)

GENETICALLY the mouse is so far the best-investigated mammal; and since inherited defects of many kinds are relatively common among mice, they present unequalled opportunity for study. The final developmental results are often very complicated, whereas what went wrong with the gene initially was very simple. It is not easy to work back from the wreckage of a complicated piece of mechanism to the spanner which was thrown into it. Much has been accomplished by using the convenient mouse, however, and a clear account of discoveries in this field is given in Dr. Gruneberg's book. Mouse genetics has contributed not only to the understanding of human genetics but to the study of inherited resistance to infectious diseases. Many of the experimental results are difficult to interpret, but Dr. Grüneberg, steering a careful course between too ready an acceptance of results and undue rigidity and scepticism, presents a good summary, writing with authority on a subject to which he has himself made important contributions.

A Short Practice of Surgery

(6th ed.) HAMILTON BAILEY, FRCS; R. J. MCNEILL LOVE, MS LOND, FRCS. (Lewis. Pp. 1034. 36*s*.)

THE sixth edition of this popular textbook of surgery has been thoroughly revised throughout and enriched with over forty new illustrations. Many of these are in colour. As a brief account of surgery the book leaves little to be desired. Its popularity largely depends on the authors' gift of summarising knowledge in few words, so that the maximum number of facts are presented in small space. In addition to this tabulation, illustrations and general layout are so attractive that a student is led on to read without realising how large a tract of knowledge he is covering. The task of the medical student is onerous, and a book of this kind is a great boon even though it does not pretend to give more than an outline of surgery. The groundwork can easily be supplemented from lectures, clinical demonstrations and reference to larger works—and it must be so reinforced if the student is to gain a sound knowledge of the subject. With this reservation the book can be warmly recommended.

Denture Base Readjustment

H. HIRSEKORN, DMD. (Wright. Pp. 122. 10*s*. 6*d*.)

To the younger generation of dental surgeons with their restricted training in dental prosthetics this little book will prove useful; but the older practitioners will find little which was not published and practised forty years ago. The author points out that badly fitting dentures may be a cause of ill health, for not only is the food improperly masticated, but the continuous irritation of a badly fitting plate over a long period may occasionally engender a malignant growth. Hypertrophy of the mucoperiosteum, and formation of a fibrous epulis are fairly common; and ill-fitting dentures are often associated with leukoplakia and lichen planus. It is less generally recognised that a badly fitting denture may be a focus of infection keeping the palate in a state of chronic inflammation; sometimes a mass of suppurating granulation tissue is present, particularly where a rubber suction-disc has been worn. The micro-organisms present in this mass—generally staphylococci—may be driven into the blood-stream by alternating suction and pressure during mastication. The author's technique to remedy these defects is lucidly described and the illustrations and bibliography are good.

THE LANCET

LONDON: SATURDAY, DECEMBER 11, 1943

A NEW BEGINNING

"THE last war," someone has said, "was like a surgical operation. This one is more like having a baby; it's not so bad, because there'll be something to show for it." This faith or optimism, so widely shared, will be refreshed by the plans adopted by the United Nations at Atlantic City last week. In UNRRA (the United Nations Relief and Rehabilitation Administration) they have conceived an international body that could exercise great constructive force. Technically its powers may be small compared with the need; but it will be strengthened by the goodwill of all who understand that neither patriotism nor victory is enough and that "after the war the peoples of this world will either go forward on the road to progress together or they will go to economic ruin together."[1]

This is for the future. Meanwhile we are concerned, like UNRRA, with practical projects, and especially with medical relief. The medical representatives of 43 nations[2] agreed at the conference that a new Health Organisation should be set up to help governments in the rapid re-establishment of their health services. One of its aims will be to share out responsibilities and resources in proportion to need and according to a coordinated plan. It will therefore require precise information about the assets and liabilities of every country, both in material and in personnel. CRABTREE[3] puts the three first problems in order of urgency as (1) starvation, (2) epidemics, and (3) maternity and infancy. The nature and adequacy of food will be one of the chief concerns of the Health Organisation, aided probably by regional commissions of experts on nutrition who will advise on changes in rations and priorities of rationing in their regions. An epidemiological section will collate reports, negotiate agreements on quarantine, and provide men and material for combating epidemics. The particular claims of children and expectant and nursing mothers will also need early attention: "prompt and adequate provision for the health and nutrition of these vulnerable groups is essential to the restoration of normal family life and community stability." Unfortunately there are many for whom normal family life can never return or must be long delayed—the orphans, the lost, and the vast populations displaced from their homes. The number who will want repatriation after the war is conservatively put at 16 millions.[4] These and other problems are so big that the governments of war-stricken countries will seldom be able to tackle them unaided. Indeed it will sometimes be necessary for the Health Organisation to take over temporarily the health administration of areas where services have broken down. But this is to be a last resort. Wherever possible, governments will be expected to assume full responsibility for health within their borders, and the national and local services will be the channel through which relief will flow. "Rehabilitation is not merely helping people. It is better than that. It is helping people to help themselves."[1]

The director-general of UNRRA is Mr. LEHMAN, formerly governor of New York state. He is the chairman (without a vote) of a central committee at Washington consisting of representatives of the United States, the USSR, China and Great Britain. This executive, whose decisions must be unanimous, is responsible to a council, comprising representatives of all the member nations, which meets twice a year and acts on a majority verdict. The doctors at Atlantic City rightly pointed out that, as almost the whole of UNRRA's activities have medical bearings, the director of the Health Organisation must hold a position enabling him, under the authority of the director-general, to develop policies and exercise technical direction over all health aspects of the work. The Health Organisation they proposed will have (1) a director of health with a technical and administrative staff, (2) a standing health committee to advise the council, the central committee, and the director, and (3) strong regional organisations, in areas such as Europe and the Far East, with regional health directors. It is hoped that the various member states will second officers of their health services who have the necessary competence coupled with ability to serve in an international team. "Members of the staff required to work away from headquarters . . . must be able to understand the outlook of the people among whom they are called upon to work. In comparison with this qualification, a knowledge of languages, though a valuable asset, is of secondary importance." In view of possible demands for technical assistance in almost any branch of medical or sanitary science the Health Organisation will also collect information about individual experts, and expert teams, available for field missions; moreover it will have to create skilled personnel by training. The standing health committee is to have 9 to 15 members, including accredited representatives of the health services of their countries and the chairmen of [illegible]. The latter bodies [illegible] Expert commissions, on the other hand, will be formed of individuals chosen for their special knowledge; "there is no necessity to make any such commission even approximately representative of a number of countries, except in so far as this may be [illegible]" [illegible] consultation, the director of health may also be empowered to summon meetings of the directors of all the national health services. "A constant objective of the health programme should be to demonstrate the effectiveness and need for international collaboration in public health. In so doing it will facilitate the later development of a permanent world-wide health organisation." Needless to say, the collaboration of existing international bodies will be sought wherever they can help.

One of the first tasks of the director-[illegible] to consider the report just issued by the

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[1] Staley, E. Address to Canadian Institute of Public Affairs. Issued by US Dept. of State, Aug. 24, 1943 (No. 353).

[2] UNR[illegible] Policies wit[illegible] an, Dr. Th[illegible] ng Liu (Ch[illegible] tain); sec[illegible]

[3] Crabt[illegible] lation. Iss[illegible] Inter[illegible] (See Me[illegible], 1943,

[4] [illegible] Times, Nov. 2[illegible], 1943, p. 4.

Committee on Post-War Requirements over which Sir **Frederick Leith-Ross** presides.[4] This estimates that the occupied countries of Europe, apart from Russia, will need in the first six months of peace 45,855,000 tons of foodstuffs, raw materials and other prime necessities—which will involve the use of 23,485,000 tons of shipping. Large as it may appear, this figure allows no more than 2000 calories a day per person; nor have the requirements of prisoners and displaced persons yet been worked out. It is clear that, as **Staley**[1] puts it, "No relief and rehabilitation programme of the United Nations can promise anything like immediate restoration of prewar consumption standards in liberated areas. What it can and must do is to assure peoples in dire distress that, subject only to the limitation of available supplies and transport, their most urgent needs will be met immediately and that ways will be found under all circumstances to help them maintain a level of subsistence which, while not comfortable or even adequate by most peace-time standards, will at least preserve life and health and give them a base from which to start an advance toward better living." The UNRRA agreement has been well termed a Declaration of Interdependence.[5] Into the fulfilment of this declaration medicine must throw its weight effectively and the new Health Organisation should give it a chance to do so.

COMFORT IN ANÆSTHESIA

How much of the misery that some patients experience after operation is due to the anæsthetic and how much to the operation itself is difficult to decide. For any discomfort that follows minor procedures not associated with after-pain it is fair to blame the anæsthetic entirely. After major operations it is harder to apportion the responsibility. Some discomforts are inevitable after certain operations, others may arise from or be increased by imperfect surgical technique. Thus unnatural postures may hamper free respiration, or put muscular and ligamentous structures under strain. Long exposure and loss of blood sap the patient's vitality. Trauma, heavy retraction, and the extensive use of abdominal packing are likely to be followed by shock, vomiting and intestinal distension. Further, trauma and rough handling cause tissue damage, and by increasing postoperative pain necessitate the longer and freer use of opiates which substitutes for pain the well-known discomforts of these drugs—depression, parched mouth, nausea or vomiting, and intestinal stasis. The repeated use of sedatives, especially when associated with shallow breathing on account of pain, also favours the development of pulmonary complications with their distressing consequences to the patient recovering from an abdominal section—a cough after gastroenterostomy feels as if a mule with a red hot shoe had kicked one smartly in the wame.

The patient's comfort, however, can in large measure be influenced for good or ill by his anæsthetist. Over-elaboration of the anæsthetic technique is not essential, and it must not be forgotten that the patient comes into hospital primarily for an operation *and only incidentally for an anæsthetic.* Yet dread of the anæsthetic—maybe from an unpleasant previous experience or from horror of losing consciou ness at all—often far outweighs anxiety about th operation itself. Too few anæsthetists can see thei hospital patients beforehand. The mere ordering ove the telephone of heavy preoperative sedation is un likely to set the patients' mind at rest. Fear of th unknown plays a large part in their uneasiness. A one patient may need is an explanation of the procedure and what he will be required to do. Anothe like the patient depicted by a [illegible] in this issue, may want to be reassured that his hear is strong enough to stand an anæsthetic. Anothe may be relieved to know that he can, if he wishes remain awake during the operation. Others ma dread suffocation and hate the idea of anything bein put over their faces, or may dislike pricks with needle or rectal injections. The amount of preoperative sedation and subsequent anæsthetic require may be considerably reduced by giving the patien tranquillity of mind and inspiring him with confidenc in his anæsthetist. And as H. P. **Crampton**[1] ha aptly remarked, "personality is non-toxic and doe not throw any strain on the heart, liver or kidneys nor does it depress respiration." Even today pre medication is too often prescribed in a routine wa without studying the requirements of each patient so that it is too depressant for one patient and o little comfort to another. The dose should be grade for each patient. Hearing is abnormally acute in th semiconscious state and a quiet darkened room t himself will help the patient to become drowsy o drop off to sleep, but this ideal is difficult to attain in a busy hospital. Excessive drying of th mouth and throat is to be avoided; after his injectio the patient should be permitted to rinse out hi mouth, and if he sips a little water it will seldom d harm. Most patients appreciate some form of basal hypnosis by which they fall asleep in their beds and only reawaken when they are back in bed with the operation done. In the interval constant expert attention is essential if safety is not to be sacrificed to comfort, and even then it will be risky to give basal hypnotics to every patient. During his preoperative examination, besides getting to know his patient and prescribing premedication, the anæsthetist should satisfy himself that the patient is fit and properly prepared for the operation. If he thinks otherwise he should straightway tell the surgeon—a cold increases the risk of chest complications and should lead to the postponement of all but emergency operations. A patient about to undergo an abdominal operation or herniorrhaphy should be impressed with the importance of deep breathing afterwards, and if this has not been done already the anæsthetist should instruct him in suitable breathing exercises.

During induction and maintenance of anæsthesia care must be taken to avoid asphyxia and oxygen-want since they are likely to give rise to sickness, if nothing worse. As light an anæsthesia as is compatible with the smooth conduct of the particular operation is to be aimed at, but it is no service to the patient if the surgeon's work is hampered by incomplete anæsthesia; the surgeon at work inside the abdomen will *take longer over the operation and be forced* to use heavy retraction and much gauze packing. The importance attached to the choice of anæsthetic agent in determining the patient's postoperative comfort might often be better applied to the skill with which the particular drug was administered. The perfect all-purpose anæsthetic agent has yet to be discovered; all have their disadvantages and limitations. The patient's safety and comfort will best be served by a wise discrimination in their choice and combination to suit the particular case. That anæsthetist will serve his patient best who is capable of using all agents and methods—new as well as old—to the best advantage, taking into account, as MALLINSON urges on another page, postoperative results as well as the patient's reactions in the theatre. The keeping of complete records is an admirable practice for bringing home to the individual anæsthetist how his patients have been faring from month to month, but even when working in similar circumstances an anæsthetist cannot safely deduce that the techniques with which he obtains the best results would necessarily bear similar fruit in the hands of others. Conditions of work, standards of satisfaction, and criteria for the assessment of postoperative complications are also such individual matters that comparative deductions are apt to be misleading unless made by an unbiased observer.

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[5] Neilson, W. A. and Swing, R. Gram, What the United Nations Relief Agreement Means to You. Food for Freedom, Inc., Washington DC.

[1] *Proc. R. Soc. Med.* 1934, 28, 94.

PENICILLIN IN THE FIELD

WHEN Professor FLOREY and his Army colleagues went out to North Africa early this summer their aim was first to decide whether penicillin could be used effectively in the field at all, and secondly to determine how and at what stage the small supplies available could be used to the best advantage. Much had already been learnt of the mode of action and dosage of penicillin from the work of FLOREY and his colleagues in civilians, and PULVERTAFT[1] and others had been working with limited quantities of the substance for a year in Egypt. But it had yet to be decided whether to concentrate efforts on wounds in which infection had got a hold, or, so far as supplies would allow, to treat all casualties from the start in an endeavour to avoid serious sepsis. It was shown in a series of septic wounds treated at Algiers that while local applications of penicillin cleared up infection of 3–16 weeks standing in flesh-wounds when various other methods had failed, the results were poor where bone was already severely infected, and the expenditure of penicillin per case was large. Clearly if a choice had to be made the saving of man-power would be greatest if the larger flesh-wounds and compound fractures could be so treated as to prevent infection and justify early suture, with consequent quicker return to duty. British surgeons were advocating early closure of wounds in 1917. Those less than 12 hours old were to be closed by primary suture, if the patient could be retained at the CCS for 7 days. Selected wounds 2–5 days old were closed at base hospitals in France by "delayed primary suture," provided they were free from suppuration and any clinical evidence of infection, and provided preliminary bacteriological examination of smears from the wound showed few or no bacteria. Complete or partial success was claimed in about 75% of cases, but these were not followed for many days. In view of the difficulty of retaining cases, the lack of effective antibacterial substances at that time, and the imperfect understanding of secondary streptococcal infection, it is not surprising that delayed primary suture was not generally adopted. In the present war no-one knows how many delayed primary sutures or secondary sutures have been performed at an early stage with success; the number does not seem to be large. This again is not surprising, for even with sulphonamide medication sepsis is common, and in the forward areas suturing is out of favour owing to the catastrophes which have followed it. But penicillin has entirely changed the picture; here at last is a non-toxic agent, which, even in the presence of pus, will eliminate gram-positive organisms from any infected surface with which it can be brought into contact in an adequate concentration. Thus for the first time suturing of a gunshot wound could be embarked on without the fear of dangerous spread of infection to the blood-stream.

In the present investigation, the preliminary report of which is summarised on another page, there was no intention to close wounds at the CCS, but the aim was to close all flesh-wounds at the forward base, whether they were less or more than 12 hours old. The success reported by FLOREY and CAIRNS and the Army surgeons who worked under their general direction has realised the hopes that civilian experience raised. Thus among 171 soft-tissue wounds closed early at Tripoli and Sousse—most of them 3–12 days old—only 7 had to be reported as failures, and these occurred early in the investigation before the technique had been fully worked out. Wounds closed after excision and local treatment with penicillin are strikingly free from reaction. After 8–12 days they may be found bathed in pink or green gram-negative pus, but when this is wiped away the wounds are seen to be clean, and free from œdema or redness. The experienced war surgeons who shared in the investigation agreed that in this series the duration of wound healing was reduced by 3–6 weeks; in a larger series the saving in hospital time, dressings, equipment and transport services would be considerable. The nursing of these patients is easier than when the wounds are left open, and the patient is spared the stink of the plaster casing or the pain of frequent dressings. Fibrosis in and around the wound is reduced, with improvement in function of the injured part. The possibility of hospital streptococcal infection and of such complications as cellulitis, lymphangitis and erysipelas is avoided, and the rapid removal of pyogenic cocci from deep wounds probably diminishes the risk of secondary hæmorrhage.

The success of penicillin in the treatment of compound fractures was encouraging though not so strikingly as in the soft-tissue wounds. Here the drug was usually given parenterally, it being thought on theoretical grounds that local application would not ensure the drug reaching all parts of the fracture. Among 36 fractures there were only 5 complete failures, and here again they occurred early in the series, but there were many only partial successes. It was thought that too much was attempted in the way of wound closure, and that for a comminuted fracture it would be wise to [illegible] potential drainage to the exterior f[illegible] 10 day. the dosage of penicillin was thought [illegible] low the cases of comminuted fracture [illegible] P results were particularly successful in the few cases where penicillin treatment was begun at the CCS level, and it seemed likely that when penicillin can be administered in the forward area no fracture will require more than a five-day course of 500,000 units at the base. The report emphasises that the forward administration of penicillin should never be taken as encouragement to do a wound suture at the CCS level; the wound must be left open until the patient can be retained in hospital and full penicillin treatment begun.

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[1] Pulvertaft, R. J. V. *Lancet*, Sept. 18, 1943, p. 341.

It is in the large soft-tissue wound and the compound fracture that penicillin may lead to the greatest revolution in treatment (and prognosis), but other triumphs are recorded in the report. Thus the 7 cases of gas-gangrene treated, though 3 of them died, demonstrated that penicillin in adequate dosage is effective in *Cl. welchii* infection, and the experience with head-wounds suggests that penicillin deserves a trial in brain-wounds for which definitive treatment cannot be obtained before 72 hours—a type of case which may become all too common if fighting fronts advance and fan out rapidly. A two-day course of sodium penicillin cured 9 cases of gonorrhœa which had failed to respond to sulphonamides, and a fresh case was cured by nine 4-hourly doses, totalling 135,000 units, confirming American reports[2]; if enough penicillin was available this treatment could be carried out in forward areas with 2 days' absence from duty. Finally, there was a small series of burns, and the satisfying experience is amply supported by BODENHAM's larger series reported in this issue. The Mediterranean report does not suggest that penicillin should be a routine treatment for burns, for which the sulphonamides usually give equally good results, but it plays an important rôle when a hæmolytic streptococcal infection of a granulating area has persisted in spite of local sulphonamide therapy and is preventing free grafting and normal healing. The common organisms insensitive to penicillin—*B. pyocyaneus* and *B. proteus*—form quantities of pus which may float skin-grafts away, but in most cases a graft will take despite the gram-negative infection. In BODENHAM's series a cream applied every 24 hours gave the best results, but a frosting of penicillin-sulphanilamide powder, spread under a graft on a non-infected surface, was useful as a prophylactic, and should prove valuable in the immediate grafting of superficial wounds.

So penicillin can make a substantial contribution to the health of wounded soldiers; its possibilities in those who are sick have yet to be explored. If enough were available—a phrase inseparable from any discussion of penicillin—for application to every wound in the forward area, sepsis as we know it might almost disappear. Meanwhile, the report urges strict control of supplies, with concentration in one theatre of operations, and gives no encouragement to the supporters of crude penicillin. Much publicity has lately been given to an American technique[3] of growing the penicillium on gauze and using this as a dressing; but the report tells a tale of some material labelled 'Penicillin' which proved inactive, and says emphatically: "In no circumstances should unassayed penicillin be used."

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[2] See *Lancet*, Oct. 30, 1943, p. 546.

[3] Robinson, G. H. and Wallace, J. E. *Science*, Oct. 8, 1943, p. 327.

Annotations

HEAD INJURIES IN CHILDREN

THE elastic skull of childhood is popularly supposed to be more tolerant of clouting than the solider domes of the mature. The belief may be partly pragmatical, for to keep at rest a child who has had a mild concussion and now feels fine is a task for giants. Guttmann and Horder[1] have analysed the after-effects of head injury in 60 children under the age of 15 admitted consecutively to an accident department; an additional 6 cases, admitted earlier, were also included because of their severity. There were 45 boys and 21 girls in the series, suggesting that head injuries are to the adventurous. A group of 38 who were of school age showed a normal distribution of intelligence on testing, 7 being below average, 2[illegible] 10 above. There was no evidence of [illegible] among them. Two-thirds of the injuries were due to road accidents. This runs counter to the experience of Wyllie,[2] who has suggested that in childhood the damage is usually done by a violent movement of the head against a fixed object. Of the 41 children injured in road accidents in Guttmann and Horder's series, 11 were passengers at the time. An analysis of the age-range of the rest injured in this way might show that the danger is chiefly to the runabout child; probably the moving-head type of injury predominates among infants and crawlers. Fractures were commoner in the series than among 165 adults admitted with head injuries (43% as against 27%). Neurological signs were present in nearly half the cases, and 5 of the consecutive 60 developed fits within an hour of the accident; of the 165 adults only one developed fits. The stage of clouded consciousness usually experienced by adult patients was replaced, or perhaps masked, among the children by a phase of emotional disturbance. Left to themselves they were usually quiet and apathetic in the early stages, but they resented conversation and physical examination and were irritable and morose; and they did not "respond to the usual little bribes." This phase usually ended suddenly, the child waking up one morning as his natural cheerful self. In the early stages headaches were rarer than among adults, but the incidence after discharge was about the same in the two groups. Three-quarters were discharged in less than 2 weeks; half of them were away from school for 2–7 weeks, a quarter being away for a longer time and a quarter for less. Late signs and symptoms of head injury are hard to assess because it is natural to attribute all later aberrations of health or conduct to "that knock he had on the head." Of the 66, 19 had nervous or mental after-effects which their relations put down to the head injury, and 6 developed the [illegible] syndrome of headache with or without [illegible] writers point out that neurotic and emotional symptoms often have nothing to do with the injury: the history may provide evidence of similar behaviour before the accident; nevertheless they mention one or two cases in which changes in temper could fairly be put down to the blow. Only 2 cases showed serious disorders of conduct, and in one of these there was a previous history of delinquency; the other was a billeted child who got across his foster mother. Of 35 of the children followed up at school, intellectual performances remained as good as ever in 32; in 2 defectives it could not be accurately assessed. In only one, a boy with traumatic epilepsy, was mental deterioration serious. The opinion that children on the whole tolerate head injury well recover quickly, expressed last year at the Royal Society of Medicine,[2] is thus not fully borne out by the present study. Skull fractures are commoner, headache nearly as common as in adults, and other after-effects though

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[1] Guttmann, E. and Horder, H. *Arch. Dis. Childh.* September, 1943, p. 139.

[2] Wyllie, W. G. *Lancet*, 1942, i, 170.

[illegible] gligible. Guttmann and [illegible] this as ground for keeping the child at rest for a long period; the cases in their series were treated with the same "active rehabilitation" as adult cases. They were not expected to lie flat unless they felt like it, and were encouraged to get up as soon as their general condition permitted.

THE VENOPRESSOR MECHANISM

It has long been taken for granted that during muscular exercise the veins must be subjected to a pumping action by the muscles which, in virtue of the valves in the veins, are thus a[illegible] o the right auricle. [illegible] and regards skeletal [illegible] f the circulatory mechanism. Should it disappear entirely, there is plenty of room in the capillaries and venules released from its supporting pressure for a large volume of blood. More important, there would now be nothing to drive the blood from the veins, and the circulation would come to a standstill. This theory envisages a type of shock in which primary disturbances of vascular tone have no place, and which is said to be a well-marked feature of conditions of circulatory failure complicated by acapnia (loss of carbon dioxide). The skeletal muscles may well be of much greater importance from the circulatory point of view than we have hitherto imagined, and Henderson's views on the importance of estimating [illegible] make a pump out of this mechanism Henderson has to assume that the slight tension of a resting muscle is maintained not by the steady contraction of one group of fibres but by a rotation of groups, one taking over from another so that individually they alternately contract and relax. There is little or no evidence for this attractive idea, though it has gained wide acceptance. Denny-Brown[2] investigated it and concluded that the same groups of fibres maintained a steady contraction. It must be conceded that in a standing position a certain amount of swaying takes place, and this must inevitably transfer the tension in the muscles involved from one place to another. It must materially help the circulation, and we are ready to believe that without such slight movements man would not be able to support the erect posture for more than a short time without circulatory failure.[3] But man is not always erect, and Denny-Brown's findings dispose of the idea of an inevitable pumping action in resting muscle. It might still be tempting to postulate continual slight movements—though in anæsthesia, for instance, it would be difficult to believe in their presence—but in curare we have a drug which effectively paralyses all striped muscle and eliminates all possibility of movement and even of tone. In animals kept alive by artificial respiration, the circulation does not stop on curarisation. In 1878 Gaskell[4] actually recorded the blood-flow from the thigh muscles of several curarised dogs, and at least one of his records shows the arterial blood-pressure, which was over 100 mm. Hg. German investigators[5] have confirmed that intra[illegible] but sa[illegible] air. [illegible] sickness—anoxia, overbreathing, acapnia, depression of spinal motor centres, loss of muscle tone, failure of venous return—deserves attention in view of the question of the advisability or otherwise of supplying carbon dioxide to airmen at high altitudes.[6]

To sum up, it is probably fair to say that the "venopressor mechanism" is an important factor in maintaining the circulation which should not be neglected in assessing the causes of circulatory failure. Its stimulation by carbon dioxide is likewise only one of the functions of this substance which should be taken into account when weighing its advantages and disadvantages. An excellent review of the various actions of carbon dioxide is given by Brazier,[7] who shows that in addition to its direct stimulation of the respiratory centre, and its well-known effect on the oxygen dissociation curve of the blood, it improves the circulation by sensitising the vasomotor centre, stimulating the carotid body and increasing muscle tone. Perhaps even more important is its direct dilator action on the cerebral blood-vessels, and Brazier poses the obvious question: in high-altitude flying, how far should arterial oxygen tension be sacrificed in order to gain the benefit of increased blood-flow through the brain? She rightly emphasises the importance of testing the efficacy of carbon dioxide by the actual performance of the individual, not by criteria such as arterial oxygen tension which, though apparently of high significance may be misleading.

WINTER TOMATOES

As a source of vitamin C the tomato stands high among the components of an ordinary diet. Holmes, Jones and Ritchie[8] note that the ascorbic-acid content of field-grown, fully ripened, "vine matured," summer tomatoes has been estimated by several workers as 25 mg. per 100 g.; so that two large tomatoes a day would supply nearly the whole of the 75 mg. of ascorbic acid recommended by the American Medical Association. So much for the summer tomato, ripening on its native vine; but what of the winter tomato? Holmes and his colleagues found a much lower vitamin-C content in late winter tomatoes than in summer fruit. They bought their tomatoes retail from two chain and two independent stores during the months of February, March and April. The average ascorbic-acid content of these tomatoes was only 8·8 mg. per 100 g. The lowest value obtained was 2·5 mg. and the highest—a solitary finding far outstripping the rest—22 mg. Thus the vitamin-C value of the fruit was only about a third that of summer tomatoes; and since this all happened in America the observers could point to the orange as a much better and cheaper source of vitamin. They had, of course, no means of knowing how long their tomatoes had been picked. Olliver,[9] testing samples within a few hours of picking, found the ascorbic-acid content of tomatoes to be 22 mg. per 100 g., which accords well enough with the American findings for summer fruit. She finds that when leaf vegetables are stored, ascorbic acid is rapidly destroyed; and root vegetables also lose the vitamin, though more slowly, on storage: but in the case of fruits she finds that "no adjustment need be made for normal storage" which suggests that mere delay between picking and buying cannot be wholly responsible for the low [illegible] content found by the American workers. In winter (or autumn) tomatoes are usually [illegible] or when barely beginning to turn colour, [illegible] off the plant for a period ranging from [illegible] to a fortnight or more. They get [illegible] of sunlight, and separated from [illegible] little encouragement to dev[illegible] tent, or even their full [illegible] thing depends, too, [illegible] differences affect [illegible]

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[1] Henderson, Y. *Medicine*, 1943, 22, 223.

[2] Denny-Brown, D. E. *Proc. roy. Soc.* 1929, 104B, 252.

[3] Hellebrandt, F. A., and Franseen, E. B. *Physiol. Rev.* 1943, 23, 220.

[4] Gaskell, W. H. *J. Physiol.* 1878, 1, 262.

[5] Schnell. *Luftfahrtmedizin*, 1942, 7, 58 (from abstract).

[6] *Lancet*, 1943, [illegible]

[7] Brazier, M. [illegible]

[8] Holmes, [illegible] Med. [illegible]

[9] Olliver [illegible]

his colleagues note that the late winter tomato of the shops is not even as rich in the vitamin as the canned or bottled tomato of the preceding summer. They quote work showing that the ascorbic-acid content of such canned and bottled fruit is about 15 mg. per 100 g.—almost two-thirds the summer figure.

YOHIMBINE AS AN APHRODISIAC

THE family of rubiaceæ has been a good companion to man. In this country, it gives us the elder of our hedgerows and the sweet smelling woodruff; in Europe, the madder which yielded alizarin and other priceless dyes; further afield, cinchona and ipecac. A more equivocal blessing is the *Pausinystalia yohimba* of the Cameroons and French Congo, from which is derived an alkaloid which has long had an under-the-counter reputation as an aphrodisiac. There was, however, little experimental evidence to warrant this belief, the erection that it produces in some animals being explained by the vasodilator action which is its most characteristic property. There may be some central action, but it is more likely that the results claimed in humans have been psychological rather than pharmacological. Recent developments in sex endocrinology have reawakened interest in the drug, and there have been claims and disclaimers of its œstrogenic action. For instance, Hechter, Lev and Soskin [1] used yohimbine in their efforts to assess the part played by hyperæmia in the effects of œstrogens on the reproductive organs; they found that one or more injections of 1 mg. caused uterine distension, proliferation of the uterine musculature and endometrial stroma, together with cornification of the vagina. These results obtained in castrated mice suggested that many of the effects commonly attributed to the specific effect of œstrogen were in fact due to hyperæmia, which is a constant concomitant of œstrogenic action. But D'Amour [2] had been unable to produce œstrus in castrated rats. A more extensive investigation has now been undertaken by Fugo and Gross.[3] They find that while 1 mg. of yohimbine given daily to immature female rats produces no precocious sexual development, doses of 1–4 mg. in intact adult female rats for 40–100 days give rather curious results. With the lower doses the normal œstrus cycle was altered by the appearance of prolonged periods of œstrus, lasting from 3–9 days, while with higher doses a condition resembling pseudopregnancy was produced. In spite of these results they were unable to obtain any vaginal cornification by similar treatment of adult castrated rats, showing that the œstrus produced in the intact rat was not due to hyperæmia and was presumably caused by some stimulation of the ovary. This latter possibility was in turn ruled out when hypophysectomised rats with intact ovaries were injected in the same manner. No œstrous conditions were produced. This placed the site of action of yohimbine one stage further back, and indicated the pituitary gland as the intermediary of the œstrogenic action. Fugo and Gross showed that this was so by experiments on adult male rats which had immature ovaries implanted into the anterior chambers of their eyes. Yohimbine injections in these rats, whether intact or castrated, led to the formation of corpora lutea in the transplanted immature ovaries. Fugo and Gross conclude that yohimbine stimulates the secretion of luteinising gonadotrophin from the pituitary gland. If these results are confirmed then here may lie the explanation of the aphrodisiac reputation of yohimbine. It will be interesting to see whether the stimulating action is confined to the gonadotrophic factor or whether the other pituitary principles are also stimulated.

MORE ABOUT THE NURSE'S PAY

A SECOND report of the Nurses Salaries Committee, chairman Lord Rushcliffe, has now appeared, proposing welcome changes in the rewards of a profession which until recently had altogether too much in common with virtue in that respect. The anomalies which honeycomb our nursing service, however, have imposed some of their pattern on the committee's decisions. Custom has always carried its full weight in this country, and custom must no doubt be thanked for the decision to make the pay of male nurses higher than that of women in the same grade. A proposal that the higher rates should be payable only to married men with families, and to women nurses who could show they had dependent relatives, would have been more daring and more just. Another decision governed by custom has been made in regard to the pay of health visitors and district nurses. In the proposed scale health visitors are to begin at £270 and rise to £360. A senior district nurse begins at £240 and rises to £300; to qualify for this salary, she must be a state-registered nurse, a state-certified midwife and must have successfully completed an approved course in district training (usually lasting 6 months); that means that she has been in training for close on 5½ years. A health visitor can train in one of two ways. She must either hold the SRN and the SCM certificates and have completed a 6-months course in public health work—in which case her training is exactly comparable with that of a fully trained district nurse except that she has taken a different course of specialised training. Or else she may take an SCM certificate (2 years), a public health course lasting 2 years, and 6-months training in a hospital—a total of 4½ years. Thus a properly qualified district nurse is at least as well trained as a health visitor. Moreover, some district nurses hold the health visitor's certificate, and these are said to be the most highly qualified women in public health nursing today. The Rushcliffe Committee recommend that where a local authority requires a district nurse to hold the HV qualification she should receive an additional £10 p.a. (bringing her maximum salary up to £310); and where she undertakes midwifery regularly she should receive a further £10 p.a. (maximum £320). Even these additions leave her £40 behind the health visitor; yet, speaking generally, the district nurse has the harder job, with more erratic hours and less leisure. It seems a pity to rate her services lower, especially now that her potential value as a public health teacher is beginning to be recognised. It must be borne in mind, however, that district nurses are apt to vary more widely in their qualifications than health visitors: at one end of the scale is the Queen's nurse, holding the qualifications already mentioned, at the other end the village nurse-midwife holding only the SCM. The committee have graded the scale downwards according to qualifications, and recommend that a statutory qualification should be prescribed for district nurses as soon as circumstances permit. They also propose a scale for state-registered nurses in nurseries, and in the main their recommendations seem a substantial advance on existing practice and level things up considerably.

THE Nuffield Provincial Hospitals Trust, at Lord Nuffield's suggestion, has offered the University of Oxford £8000 a year for ten years towards the cost of establishing and maintaining a plastic surgery unit. The university has accepted the offer and has appointed Mr. T. Pomfret Kilner as the first director of the unit with the title of Nuffield professor of plastic surgery. The Radcliffe Infirmary will provide hospital facilities for the unit, and these will be supplemented by the Ministry of Pensions.

MR. REGINALD WATSON-JONES will speak on a surgeon's impressions of Soviet Russia at the annual general meeting of the Anglo-Soviet Medical Council, on Friday, Dec. 17, at 5.30 PM, at 1, Wimpole Street, London, W.1.

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[1] Hechter, O., Lev. M. and Soskin, S. *Endocrinology*, 1940, 26, 73.

[2] D'Amour, F. E. *Ibid*, 1935, 18, 235.

[3] [illegible] N. W. and Gross. E. G. *Ibid*, 1942, 31, 529.

Special Articles

INCAPACITATING SICKNESS AMONG MERCHANT SEAMEN

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M D GLASG, F R F P S, D P H
PORT BOARDING MEDICAL OFFICER, GLASGOW

UNDER a war-time agreement with the Shipping Federation, the port boarding medical officers of the Glasgow Port Health Authority attend cases of sickness among merchant seamen while their ships are in the Clyde anchorages emergency port.

During the two years from May, 1941, to May, 1943, these medical officers were called upon to deal with 5374 cases of sickness among Merchant Navy personnel while their ships were in the anchorage; these do not include cases of sickness found among the crews of ships on their arrival at the port. The incidence of disease among these cases is shown in an abridged form in table I. From the original table I have selected diseases which are chief contributors to incapacity among merchant seamen:

TABLE I

INCAPACITATING SICKNESS AMONG MERCHANT SEAMEN

Disease	1941–42		1942–43		Total	
	Cases	%	Cases	%	Cases	%
1. *Infectious disease*—						
Acute	162	9 1	236	8·2	458	8·5
Chronic	17	1·0	40	1·1	57	1·1
Venereal disease	165	9·3	377	10·5	542	10·1
Total	344	19·4	713	19 8	1057	19·7
2. *Trauma*—						
Accidents ..	291	16 4	566	15·7	857	15 9
Caused by physical agents.. ..	53	3·0	63	1·7	116	2·2
Total	344	19·4	629	17·4	973	18·1
3. *Systemic diseases*—						
Heart and blood-vessels ..	50	2·8	89	2·5	139	2 6
Respiratory system	178	10·1	254	7·0	432	8·0
Gastro-intestinal system ..	255	14·4	574	15·9	829	15·4
Genito-urinary system ..	17	1·0	42	1·2	59	1·1
Motor system ..	110	6·2	194	5·4	304	5·7
Nervous system	24	1·4	36	1·1	60	1·1
Tumours ..	7	0·4	23	0·6	30	0·6
Adenitis ..	1	0·1	25	0·7	26	0·5
Blood	4	0·2	9	0·2	13	0·2
Eye	31	1·8	65	1 8	96	1·8
Ear	31	1·8	76	2·1	107	2·0
Skin	271	15·3	556	15·4	827	15·4
Unspecified ..	103	5·8	319	8·9	422	7 9
Total	1082	61·3	2262	62·8	3344	62·2
Grand total ..	1770	100·0	3604	100 0	5374	100 0

Disease	*Cases*	%
Infectious disease	515 ..	9 6
Venereal disease	542 ..	10·1
Trauma	973 ..	18·1
Bronchitis	254 ..	4·7
Defective teeth	230 ..	4·3
Gastritis	267 ..	5 0
Skin diseases	827 ..	15·4
Scrimshanking	191 ..	3·6

INFECTIOUS DISEASES

Infectious disease, including venereal disease, is responsible for 10·7% of all sickness. Of this figure [illegible] influenza. Influenza is [illegible] verish colds, malaria ar[illegible] seases, tonsillitis and influenza, are spread by close contact with the patient, and in overcrowded forecastles the disease spreads rapidly. Tuberculosis is responsible for 1·1%, but it is difficult to estimate how many of these patients went to sea because of the mistaken idea that the sea air would benefit their tuberculosis.

The steps to control the spread of these respiratory infections include:—

1. Reduction of overcrowding in forecastles.
2. Increase of isolation accommodation on board ship.
3. Education of masters of the high infectivity of these diseases, especially tonsillitis and influenza.
4. Prevention, by strict medical examination, of any patient suffering from tuberculosis adopting the Merchant Navy as a career.

Venereal disease accounts for 10·1% of all incapacity among merchant seamen, and is being considered separately in view of its special nature. The figure is very high, and is known not to include all cases. Steps should be taken immediately to combat this disease. The measures to reduce its incidence would include:—

1. Examination before embarkation and disembarkation of all seamen, followed by intensive treatment ashore of all recognised cases—the treatment to conform to the recommendations drawn up by the Ministry of Health and circulated in November, 1942.
2. Closer coöperation between the medical officers of the Merchant Navy reserve pool and medical officers of the port health authority is essential, and is possible.
3. Closer inspection of all medical equipment carried on board.
4. Reconsideration, as an urgent measure, of the possibilities of prophylaxis as opposed to concentration on treatment after infection. This is a field of activity which has been explored with success in the Fighting Services, and it is to be hoped that the experience gained will be available for the benefit of the merchant seamen.

TRAUMA

Trauma accounts for 18·1% of all sickness. In any industry this would be a high figure, but it is likely that in the Merchant Navy it is higher during war than in peace for obvious reasons. Measures to reduce the incidence would include:—

1. If the ship is in port, and the dockside illuminated for [illegible]
2. Decks and alleyways should be kept clear of obstacles and wet refuse.

SYSTEMIC DISEASES

Systemic diseases account for 62·8% of all incapacitating sickness. Of these, diseases of the respiratory system, the gastro-intestinal tract and the skin are the main contributors.

Bronchitis is chief among the respiratory diseases. The ætiology is vague. There are various types, some of which are related to: a respiratory infection; dusty atmospheres; extremes of heat and cold; or psychoneurotic components, which perpetuate symptoms and may even amount to the extent of a secretory neurosis of the bronchi.

Defective teeth and gastritis are chief contributors to the high incidence among the gastro-intestinal diseases. Defective teeth may cause gastritis, but gastritis is a vague term which covers a variety of stomach complaints due to a variety of causes. Modern medical opinion is more and more inclining to emphasise the important part played by the emotions in many of the cases of gastritis.

Half of the skin complaints are attributable to inflammatory conditions. Scabies is responsible for 5·5% of all sickness.

Many of the disease terms included under systemic diseases cover psychoneurotic and psychosomatic states, but their number is difficult to estimate. I have hesitated to use the word scrimshanking in an article dealing with merchant seamen, but this is the only term I can find to describe the type of complaint affected by some in their desire to avoid sailing on a certain ship or to a certain destination. Some of this scrimshanking is definitely conscious, but in many the motives for the illness have been referred to the unconscious. Measures to reduce the incidence of these systemic complaints would include:

Bror[illegible]

(*b*) [illegible] n stokeholds or warm kitchens into the open. This could be done by the provision of a rest-room and baths.

(c) To improve the welfare of the men is to improve the morale of the ship, with resulting decrease in the psychoneurotic components which perpetuate this disease.

Defective teeth.—Closer attention to the condition of the teeth and provision of dentures should be made at the signing-on medical examination.

Gastritis.—Like bronchitis, gastritis of neurotic origin could be helped by attention to the welfare of the men. In my opinion, however, it is more often associated with ill-cooked meals, and closer scrutiny of the credentials of cooks would help eliminate this complaint. Recently, while investigating an outbreak of enteritis on board a ship, I learned that the cook's only previous occupation had been that of a cement mixer, that he had had no training in cooking and that he boiled the ship's laundry in the urns used for making the crew's tea.

Skin diseases.—More spray baths and better forecastle conditions would help to reduce skin diseases.

In table II the proportional incidence of illness due to various diseases among Merchant Navy personnel is compared with that among men following another dangerous occupation (mining), and among the civilian male population in industry.[1]

TABLE II

INCIDENCE (%) OF DISEASE IN THREE GROUPS OF MEN

	Scottish miners	*Civilian Scottish men*	*Merchant Navy*
Tuberculosis	0·28	0·69	1·1
Tumours	0·1	0·3	0·6
Influenza	23·4	22·4	3·3
Infectious disease	0·4	1·6	5·2
Cerebral hæmorrhage	0·07	0·19	0·1
Violence	15·7	12·2	15·9
Bronchitis and pneumonia	6·04	7·32	5·4
Upper respiratory	6·28	10·6	1·3
Gastric and duodenal ulcers	0·83	1·4	1·1
Appendicitis	0·9	1·6	1·0
Hernia	0·4	0·76	1·1
Gastritis	5·7	6·0	5·0
Diseases of kidney	0·5	1·1	0·9
Inflammatory skin	10·2	8·5	7·1
Skin diseases	1·3	1·8	8·3
Rheumatic and joint conditions	13·9	13·6	5·6
Cardiac and nervous debility	0·36	0·66	0·7
Neurasthenia	0·27	0·50	0·7
Undefined debility	0·33	0·43	1·0

From the table it is seen that the proportional incidence of tuberculosis among merchant seamen is 4 times as high as that in miners, and fully 1½ times as high as the relative incidence of the disease among the civilian male industrial population. The proportional incidence of accidents is highest among merchant seamen, and this also applies to skin diseases. The disease terms which are generally used to denote nervous strain (e.g., cardiac and nervous debility and neurasthenia) show that among merchant seamen the proportional incidence is higher than among the other two groups under review.

THE MOTHER AS PAINLESS SPECTATOR

Dr. Theodore James (Gwelo, S. Rhodesia) writes that he has employed the method of local anæsthesia in childbirth advocated by Sheldon (*Lancet*, 1941, ii 569). 'Omnopon' and hyoscine were used to help the mother (a primipara of 27) through the first stage. When the head was on the pelvic floor 1% procaine with min. 10 of 1 in 1000 adrenaline in 100 c.cm. was used to infiltrate the perineum, the injections being made, as Sheldon recommends, over the external abdominal ring, medial to the tuberosity of the ischium, and into the perineal body. The mother completed the second stage easily and painlessly except for the bearing down pains which she used to the best effect; and she insisted on watching the egress of the child's head in a hand mirror; when it was crowned she knew nothing about it, and when the head was born she looked on. She sustained only a very small tear of the vaginal mucous membrane. The emotional and psychological effect was, he says, a pleasure to see. The mother looks back on the birth of her child with interest and satisfaction.

PENICILLIN IN WAR WOUNDS

A REPORT FROM THE MEDITERRANEAN

Penicillin has been on trial for combating wound sepsis in North Africa since July, 1942, and a preliminary report has now been made to the War Office and Medical Research Council by Prof. H. W. Florey, FRS, and Brigadier Hugh Cairns, FRCS.

The object was not primarily to ascertain whether penicillin is capable of controlling [illegible] in septic conditions—this has be[illegible] in England—but to answer the questions: Can penicillin be used effectively in the field at all; and if so, how much is required, and at what place in the Army organisation can it be used to the best advantage? Since a quick answer was wanted, the work has been compressed into three months, a period too short for full assessment of the results.

It is now comparatively easy to administer penicillin parenterally—an effective dosage is known and methods of administration have been worked out—but supplies are too small to permit of the large doses required by this route. Here the problem was to work out techniques for giving small amounts by local application which would be simple enough to be used by surgeons and nursing staff in the busy period of battle. The report is based on the treatment of more than 300 battle casualties. No attempt has been made to compare the value of penicillin with that of the many alternative methods of treatment in use. This would be an undertaking of great magnitude, and the report mentions that after four years of war there are still no conclusive observations on the effect of sulphonamides in the prevention and treatment of wound sepsis. Moreover, there seem to be no available figures on such points as the proportion of fractures which become chronically septic, the number of wounds successfully sutured, and so on.

PLAN OF THE INQUIRY

The experience of Florey and his colleagues in Oxford from 1940 onwards made it clear that penicillin might play an important part in the control of infection associated with war wounds if it could be obtained in sufficient quantity. A supply was sent out to Cairo from Oxford in July, 1942, and the promising results obtained with this and batches from elsewhere by Lieut.-Colonel R. J. V. Pulvertaft led to attempts to manufacture penicillin in Egypt. Pulvertaft and Colonel J. S. K. Boyd were convinced that of all the antibacterial substances they had tried penicillin offered the best prospect of cleaning up the chronic sepsis met with in base hospitals, and Pulvertaft began experiments with crude penicillin he made himself. As further supplies became available, early this summer Lieut.-Colonel Ian Fraser, Major Scott Thomson, and soon afterwards Professor Florey and Brigadier Cairns went out to North Africa; at home Flight-Lieutenant D. C. Bodenham was studying the effects of penicillin in burns and other surface wounds (his report appears on p. 725 of this issue of The Lancet), and it was being tried at the Military Hospital (Head Injuries) in cases of pyogenic meningitis which did not respond to sulphonamides.

Fraser and Scott Thomson arrived in Algiers after the end of the fighting in Tunisia, and studied the effects of penicillin on a miscellaneous collection of cases of chronic sepsis. They found that where penicillin-sensitive organisms were present they could be eliminated from accessible surfaces, but that gram-negative ones persisted; deep lesions were difficult to treat, and the method of instillation through tubes gave poor results. Parenteral exhibition of the sodium salt successfully eliminated sensitive organisms from bone and other infections.

From these cases it was apparent that it was far too late to start penicillin treatment, weeks or months after wounding, at a rear base hospital, and arrangements were made to treat cases from the next campaign at forward base hospitals. It would clearly effect a valuable saving in man-power if a method of treatment could be evolved which would prevent infection of the larger flesh-wounds and permit of early suture, with consequent earlier return to duty. There were no reliable figures to show the number of delayed primary sutures or secondary sutures performed at an early period in this theatre of war, but the proportion of wounds sutured does not seem to have been high. In the Eighth Army, for instance, the time between wounding and secondary suture appeared to run into weeks, at best. This is not surprising, for it seems fairly certain that notwithstanding the routine use of sulphonamides most battle casualties are at some time infected. Suturing in the forward areas was therefore strongly deprecated, owing to the many catastrophes which had followed this procedure.

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[1] Department of Health for Scotland. Report on incapacitating sickness in the insured population of Scotland, 1933–34, [illegible] 1935.

With these considerations in mind, an attempt was made to suture soft-tissue wounds—those not involving bones or the major cavities—at the first hospital where the patients could be held for observation, penicillin being relied on to check or abolish infection by gram-positive organisms. Cases were received at the forward base 2–22 days after wounding, a few wounds among [illegible] and area troops being less than 12 hours old. [illegible] evious treatment had been the standard Army [illegible] cision (of [illegible] the application [illegible] of [illegible] the wounds were more or less infected, [illegible] of such a nature that no surgeon engaged in the present observations would have considered closing them in the condition in which they were received.

A group of compound fractures was also observed. The present practice in such cases is to provide good drainage, with removal of the obviously necrotic material and foreign bodies. Opinion has veered from massive excision to more moderate procedures. The limbs are enclosed in plaster or otherwise immobilised after placing sulphanilamide powder in the wound and dressing with soft-paraffin gauze. Official instructions in the Middle East are to give sulphanilamide by mouth during transport, and, if necessary, subsequently; but this treatment [illegible] The treatment [illegible] ost cases, but [illegible] up- [illegible] loss [illegible] to [illegible] emur. [illegible] t fractures mean either the complete loss of [illegible] r at best a long period of inactivity and rehabilitation. An attempt was therefore made to close open fractures by suturing the wound, gram-positive organisms being controlled by the parenteral administration of sodium penicillin for 5 days.

A third series of observations were made on the control of sepsis in various types of head injury by two neurosurgical units. There is undoubtedly a big field for investigation in the use of penicillin in abdominal and chest injuries, but no observations of such cases are included in the present report.

The study was extended by Fraser and Major J. D, MacLennan in Sicily. There the plan was for them to see flesh-wounds early, at a CCS or FSU, trim the wounds, and dress them with penicillin-sulphanilamide powder, the patients then being sent back to the general hospital at Tripoli where further bacteriological examination and immediate suture could be carried out.

METHODS OF ADMINISTRATION

If penicillin was plentiful there can be no question that parenteral administration should be practised in nearly all cases. By this route the agent is brought by the blood-stream to all viable tissues, preventing the [illegible] bacteria in those tissues. [illegible] small and it has therefore [illegible] possibility of using small [illegible] icillin is rapidly absorbed [illegible], and in a concentration [illegible] um required for bacteriostasis at the immediate surface; it is of little value to sterilise the surface of a wound if bacteria are left a few millimetres below the surface or locked away in pockets.

Local application.—In this series four forms of local application have been used:

1. As a solution of the calcium salt in distilled water or saline (250–500 units per c.cm.).
2. In a cream with lanette wax, which will hold the penicillin in contact with the tissues longer than is possible with a watery solution (250 units per g.).
3. As crude dry calcium penicillin, applied directly to the infected surface, the penicillin dissolving in the fluid present. This method may be unnecessarily wasteful, for the powder is difficult to spread thinly over a large wound.
4. As a powder diluted with a sulphonamide, insufflated on the infected area with a blower; here the diluent was sulphanilamide, but Bodenham and others have used sulphathiazole (500–5000 units per g.).

In the treatment of soft-tissue wounds, after the usual surgical excision, small rubber tubes with one hole at the end were inserted, usually through stab-holes, so that fluid injected down them had a good chance of reaching all parts. The wound was then sewn up. Up to five tubes were used, according to the size of the wound. An adequate dosage was found to be about 3 c.cm. (750 units) injected every 12 hours. The ends of the tubes were brought out through the main dressing, so that injections could be performed with little disturbance. In most cases it is sufficient to leave the tubes in for 4 days. It was found best to give the first injection of fluid through the tubes while the patient was still on the operating-table. Penicillin-sulphanilamide powder was dusted on any raw surfaces after removal of the tubes.

A few wounds were sutured without tubes after a single introduction at the operation of not more than 10 g. of penicillin-sulphanilamide (5000 units per g.). In wounds where œdema made closure difficult, the open wound was at first insufflated daily with penicillin-sulphanilamide (2000 units per g.), tubes being inserted and the wound sutured when the œdema had subsided. In some particularly dirty wounds, such as amputation stumps and compound fractures, tubes were put into the unsutured wound and twice-daily injections given for 5 days.

For wounds that had been infected for many weeks a lanette wax paste was used as a daily dressing. This method may have advantages where much slough has to be removed, or for cavities difficult of access.

In the cases treated at a CCS a penicillin-sulphanilamide powder, containing 5000 units of penicillin per g., was inserted into the wounds after the usual trimming; these wounds were left open, covered with soft-paraffin gauze and the usual dressing.

Parenteral administration.—For intramuscular or intravenous injection the sodium salt was used, carried either dry or in strong solution in ampoules or bottles, and diluted with distilled water when required. A dose of 15,000 units three-hourly was sufficient to maintain a blood concentration which [illegible] coccus. The amount of p[illegible] varied widely with differen[illegible] caused no serious discomfort, while others produced so much pain, induration and stiffness that only the toughest patients could stay the course.

Because of the pain of intramuscular injection, the intravenous route was tried, hospital blood-transfusion service supervising the drips. The penicillin was administered by continuous drip in glucose saline, 2 litres containing 100,000 units being given in 24 hours. Here the different batches varied widely in their pyrogenicity, and there seemed to be no correlation between pain-production or intramuscular injection and tendency to produce fever and rigors.

Probably the best practice will be to use continuous intravenous therapy where possible, and the intramuscular route elsewhere. It is hoped that manufacturers will produce a pyrogen-free penicillin.

RESULTS

Chronic septic wounds.—Septic wounds 3–4 months old were treated at Algiers by Fraser, with Scott Thomson doing the bacteriological investigation. The wounds were infected in about equal proportions with hæmolytic streptococci alone, staphylococci alone, or these org[illegible] in combination. Most of them also contained [illegible] organisms. All were suppurating.

In about half of the 10 flesh wounds second[illegible] or skin-graft had been tried and failed [illegible] infection was deep-seated; in most [illegible] good general condition. Local [illegible] quickly controlled the [illegible] rendered the wounds suit[illegible] ary suture.

Most of the 18 fracture patients were very ill, with fever, anæmia and loss of weight. Three had large bedsores, and in some of them deep-seated abscesses had formed beneath partly or wholly healed wounds. Flies were numerous and persistent, and it was often impossible to prevent infestation with maggots. All the patients had had sulphonamides locally, and by mouth or intravenously as well. The results of local application of penicillin were poor. With parenteral administration of sodium penicillin some dramatic recoveries were obtained, though in two cases of fractured femur it failed to control the infection. It was concluded that treatment of old-standing septic compound fractures would require large amounts of sodium penicillin, which might be more profitably used in more recent wounds.

Recent soft-tissue wounds.—Early closure of 171 soft-tissue wounds was carried out by 10 surgeons at 5 general hospitals at Tripoli and Sousse. Most of the wounds were 3–12 days old when closed. As experience and confidence grew it was found possible to close almost all wounds, except those in which a missile had produced gross destruction of skin. Most of the wounds were infected, and some were actually purulent, but no case was rejected for this reason, and the wounds were closed before the results of the preliminary bacteriological examination were known. Yet none of these patients was placed in danger by the closure, and only once was it necessary to release the stitches.

The progress of these wounds followed a fairly uniform pattern. They are remarkably free from reaction. On the second to fourth day thin salmon-pink purulent fluid can be aspirated from the depths of the wound; this is rich in healthy polymorphs and on culture yields coliform bacilli. When unveiled on the eighth to twelfth day the wound may be found bathed in thin salmon-pink pus which goes green on the dressings, but after this gram-negative pus is wiped away the wound and stitch-holes are found to be clean and free from œdema or redness—the wound is discharging pus and yet healing well. Thereafter, provided the stitches are not removed too soon, linear healing results. The presence of pus must not be regarded as an indication for removing the stitches immediately; tubes were removed on the fifth day without disturbing the dressings or plaster, and stitches on the tenth to fourteenth day or even later. *B. pyocyaneus* often persists in the wounds until healing is complete.

At or after 3 weeks the wounds could be classified in three groups: 104 were united and epithelialised throughout their whole extent and quite dry; 60 were still gaping and granulating in one or more small areas but usually healed rapidly by granulation; in 7 the whole or greater part of the wound had broken down, failure usually being due to errors in the technique of wound closure.

Thus in the closure of recent flesh wounds, to quote Lieut.-Colonel J. S. Jeffrey, "with penicillin the obstacle of infection has been practically overcome."

Recent fracture.—Treatment of battle casualty compound fractures with penicillin was confined to two general hospitals—at Tripoli and Sousse—in order to concentrate the available sodium penicillin. The aim was to prevent chronic infection of the fracture and to convert it as soon as possible into a closed fracture by suturing the wound. It was felt that only parenteral treatment was likely to be effective in disseminating the drug about a compound fracture. Altogether 36 fractures were treated; they were mostly comminuted fractures of long bones, with wounds of sufficient size to warrant attempts at closure. They had all been temporarily immobilised in the forward area and were 5–14 days old on arrival at the forward base hospitals. In 31 it was possible to suture the wound completely; in the other 5 this was mechanically impossible. In the forward areas 27 had been treated with sulphanilamide and soft-paraffin gauze; in 9 Fraser had gone forward and given initial treatment with penicillin-sulphanilamide powder insufflated into the wound.

The routine was to give a 5-day course of sodium penicillin either by 3-hourly intramuscular injections or in a continuous glucose-saline drip infusion, totalling 500,000 units. Gram-positive cocci were present on arrival at the base in 18 of the 36 fractures, and at the of penicillin treatment they were present in 15. The presence of gram-positive organisms did not run parallel with success or failure of the wound healing; they were present in some cases which made an excellent recovery, but they were always present in cases which broke down completely. In 5 of the 36 cases the treatment failed, but these came early in the series when the technique was being developed. One patient died of head injury; the remainder, after 2 months' observation, were either healed or free from serious infection; there was no evidence of delayed bony union.

It was thought that too much was attempted in the way of wound closure—in a comminuted fracture it is wise to leave potential drainage to the exterior for the first week or ten days—and that the dosage in fractures of the tibia and femur was too small; a total of 700,000 to 1,000,000 units should be given over 7–10 days, though this may be unnecessary where penicillin is given in the forward area.

Gas gangrene.—It was thought impracticable to treat a developed case of gas gangrene by local application, and the seven cases treated all received sodium penicillin parenterally, the dosage ranging up to 750,000 units. Four of the patients recovered and three died; all were *Cl. welchii* infections. In two of the fatal cases the gas gangrene appeared to have been overcome when the patient died, in one case from toxæmia, possible anaphylaxis and acute dilatation of the stomach, and in the other from malignant tertian malaria; but the post-mortem investigations are not yet complete. Of the cases which recovered, two were severe, the gangrene involving the calf in one and the upper thigh in the other; one in an amputated thigh was limited to the remaining half of the sartorius; and one was a gangrenous cellulitis of the leg.

In one of the fatal cases histological examination of the muscles of the wound showed very extensive macrophage reaction at the edge of the zone of necrosis of the muscle. Since spreading gas gangrene is said to produce no cellular reaction, this macrophage reaction may be regarded as additional evidence that penicillin in adequate dosage is effective against gas gangrene.

It is clear from this experience that penicillin will not counteract toxæmia; all the dead muscle should be surgically removed and massive doses of anti-gas-gangrene serum given. Fulminating cases, with profound toxæmia, are not likely to be saved by penicillin. Penicillin may be expected to play an important part in prevention.

Head-wounds.—The current practice of closing head-wounds completely after excision and the local application of sulphathiazole, as described by Eden in the *Lancet* of Dec. 4 (p. 689), has given satisfactory results in recent wounds; thus in the El Alamein and Tunis battles primary healing of wounds up to 3 days old was obtained in 90% of cases. In the present investigation attention was particularly directed to penetrating brain injuries more than 3 days old, and at Tripoli and Sousse 23 brain-wounds 3–12 days old were treated with penicillin. Almost all of them were infected with gram-positive pyogenic organisms, and about half were frankly suppurating. The wounds were excised, cleaned and closed, injections of calcium penicillin solution being given 12-hourly for 3–5 days through a stab-hole into the brain cavity, the average total dosage being 15,000 units per case. In addition, calcium-sulphanilamide powder was applied to the wounds during dressings and occasionally during operations; intramuscular penicillin was given to 3 patients who had compound fractures of the limbs as well as brain injuries.

There were 3 deaths in the 23 cases, 2 of them from infection. In the remainder, wound healing was satisfactory, except in one case where the wound edges broke down sufficiently to expose a small brain fungus which subsequently healed. Bacteriological examination of material aspirated from the brain-wounds showed that, with penicillin, gram-positive cocci disappeared from the wound within 48 hours in most cases.

This experience suggests that penicillin deserves a more extensive trial in brain-wounds for which definitive treatment cannot be obtained before 72 hours. For brain-wounds less than 3 days old there seems to be no case for using penicillin while it is scarce.

Non-penetrating wounds 4–16 days old, which were suppurating and would hitherto have been left open were successfully closed and treated with penicillin solution through tubes for 3–5 days, using a total dosage of about 3000 units. In the scalp wounds not associated with fracture of the skull, first intention healing after excision could be secured with a single application of 1–3 g. of penicillin-sulphanilamide powder, provided the powder was not washed away by bleeding during closure of the wound.

Gonorrhœa.—In Tunisia many cases of gonorrhœa were occurring in highly trained fighting troops, such as [illegible] shortly before they were due to fight, [illegible] portion of sulphonamide-resistance seemed [illegible] higher than at home. Nine cases which had failed to respond to sulphonamides, and one fresh case, were treated with sodium penicillin, all other forms of treatment being withheld. The dosage was based on previous data for staphylococcal and other infections, most receiving 12 intramuscular doses (total 180,000 units) in 48 hours. Urethral discharge promptly dis[illegible] in every case—"like turning off a tap," says [illegible]iest. Most of them were kept under observa[illegible] 2–4 weeks after treatment and no relapse was [illegible]

Burns.—Penicillin applications were tried in a few extensive burns which had remained persistently infected [illegible] streptococci in spite of sulphathiazole [illegible]avines and sulphadiazine locally. Their [illegible]tremely small amounts of penicillin-powder (20,000 units) was uniformly [illegible] grafts took satisfactorily in spite of the [illegible]m-negative pus.

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The following officers were responsible for different sections of the report.

Bacteriology: Major Scott Thomson. Chronic septic wounds: Lieut.-Colonel Ian Fraser; Major Scott Thomson; Captain A. Pirie. Soft-tissue wounds: Lieut.-Colonel J. S. Jeffrey. Recent battle casualties: Lieut.-Colonel E. L. Button. Closure of large soft-tissue wounds: Lieut.-Colonel D. W. Jolly; Major W. E. Hamilton. Efficiency of penicillin in war wounds: Lieut.-Colonel A. L. d'Abreu; Major H. L. de Waal. Soft-tissue wounds at a general hospital: Captain G. K. Tutton. Prevention of wound sepsis: Lieut.-Colonel Fraser; Lieut.-Colonel Jeffrey; Major J. D. MacLennan; Major [illegible] Primary closure of wounds: Lieut.-Colone[illegible] Lieut.-Colonel Jeffrey [illegible]; Major K. C. Eden; [illegible] Major W. H. D. Priest. Burns: Major Patrick Clarkson.

The report is not on sale. A few copies, containing full tables and figures, may be seen by application to the War Office (AMD 7).

PSYCHIATRISTS IN CONFERENCE

PSYCHIATRISTS, especially those whose work has lain [illegible] the disadvantages [illegible] isolation. The Minister of Health [illegible]ns from considera[illegible]ices relieved much [illegible]sed that there are matters in connexion with the treatment of the insane which cannot be put right without changes in the law, and that the chances of prompt legislation on such a matter are less hopeful than most psychiatrists would wish. There are many psychiatric questions, apart from modifications in the law, which will have to be taken into account in a better organised comprehensive health service. The Royal Medico-Psychological [illegible] recently put forward some broad pro[illegible] to serve as a basis for discussion. [illegible]f proposals were that—

[illegible]mittees and mental advisory committees should be established in every area of the country.

All matters appertaining to mental health administration should be removed from public assistance.

The name of the Board of Control should be changed to the Board of Mental Health and its powers should be extended.

A medical officer of mental health should coordinate the work in each area.

A medical superintendent should be in complete control of each mental hospital and mental deficiency institution.

Other proposals dealt with the better education of medical students in psychiatry and psychology, the development of psychiatric units at universities and in general hospitals; with more generous staffing of mental hospitals and more comprehensive measures for the care of the mentally defective. All delinquent children, it was suggested, should be examined by a psychiatrist whose report should be available to the courts.

Since these proposals had not received from psychiatrists all the consideration desirable in any final recommendations that might be made by the association, it was decided at the quarterly meeting held on Nov. 24 to form a broad committee representative of psychiatrists of every kind, to formulate their views for submission to the association.

A general discussion of postwar psychiatry was held during the day. In an opening address Dr. Gordon Masefield, honorar[illegible] the problems of t[illegible] affecting those wo[illegible] Lewis and Dr. R[illegible] in his absence by Dr. M. B. Brody) gave brief opening papers on psychiatric clinics, with particular reference to neurosis and child psychiatry, and to problems of location and staff. In the afternoon Dr. Norwood East discussed delinquency and Dr. Noel Burke mental deficiency. Dr. East said that special problems in connexion with criminal behaviour called for experience such as the ordinary psychiatrist does not possess, and outlined the general plan for improved psychiatric care of suitable offenders. Dr. Burke advocated that the [illegible] of legal and administrative procedures. Air-Commodore R. D. Gillespie felt that provision should be made for teaching facilities in any reorganisation of medical services and drew attention to the need for staff liaison between mental hospitals and teaching departments.

LEBANON AND HASHISH

THE Lebanon and Syria have occasioned anxiety in other than political or constitutional questions. The illicit cultivation of hashish (cannabis indica) has, by its contraband export into Egypt, attracted the vigilant attention of Sir J. W. Russell, director of the Central Narcotic Bureau; his report to the Egyptian government for 1942 abounds with interest. As the result of two personal visits to the Levant states to investigate the source of the huge imports of hashish into Egypt, the director was able to secure the cooperation of the British and the Fighting French authorities in eradicating the pernicious hemp over large areas. A report made to General Catroux in July, 1942, stated that there were 150 hectares of Indian hemp under cultivation in the Levant states, producing 75 tons of dry raw *hashish and 60 tons of prepared hashish; of these 90* hectares had then been cleared of the plant.

The British Security Mission in Syria and the Lebanon, under instruction from General Maitland Wilson of the 9th Army, and in coöperation with Monsieur Gautier and Lieutenant Boutillon of the Sureté Générale, proclaimed the cultivation of hashish, and proceeded to eradicate the growing hemp. The inhabitants were hostile, but Indian and Australian troops overcame the apathy or indifference of the gendarmerie and gardes mobiles. It appears that, under Vichy France, Syria and the Lebanon had become completely "hashish-minded," notwithstanding the laws in force against trade in the drug.

Sir J. W. Russell reports that the price of hashish wholesale in Syria was £E3 per kilo, that it sold in Egypt at £E35 to £E40 per kilo and further that if the destroyed hashish had been successfully smuggled into Egypt the dealers in Egypt would have realised £E4,200,000. The Director expresses the hope that the independent governments of Syria and Lebanon would carry out the law and prevent this flood of poison finding its way into Egypt.

"[illegible]ns, of [illegible] on its [illegible], ever more directly on science and its applications . . ."—SIR HENRY DALE in his presidential address to the Royal Society on Nov. 30.

In England Now

A Running Commentary by Peripatetic Correspondents

It would be good for all of us if we could change places with our patient an hour before he is due to go to the theatre for his operation. This is something of the atmosphere as it was described by one of my patients after an appendicectomy.

An hour before the operation (he writes) I am lying in bed not feeling too brave about it all. Along comes the nurse and gives me a hypodermic injection. It hurts—the needle is blunt, and she has to make several jabs to get it in. Anyway my nerves are all keyed up to a high pitch and I am probably just waiting to be hurt. I see by my chart left on my bed while the nurse was called away that I am running a high temperature. I have really a bad cough, and my heart is beating very rapidly as I feel it surreptitiously under the bedclothes. My pulse seems to be going 250 to the minute, or am I counting two pulses, one in my wrist and one in my thumb? I wonder will my heart stand the anæsthetic. I would like to see the doctor who is going to give me this. He ought to test my heart and tell me it won't pack up on me. I wish I had a drink—I do feel so thirsty. I am getting very sleepy now, but do not seem able to go off properly. I wish that nurse would not talk so loud. I thought she had quite a soft voice. It sounds to me like a foghorn now, I expect it is the dope they have given me. Heavens, here they are coming for me already and I am not asleep yet. It would have been a good idea to have put me in a room by myself with the blinds drawn, I might have been able to sleep then. They promised me I would be asleep before I was taken out of the ward. They start to wheel me out now. That jolt as they hit the jamb of the door did not help me to sleep, nor do the other jolts as they negotiate the corners along the corridor. I wish someone had put a drop of oil on the wheels of this trolley. The squeaks, apart from being disturbing to me, must be annoying for the other patients. There is quite a traffic jam now. The chap in the next bed to me was trundled along to the theatre an hour ago. Here he is being wheeled back. His job is over, lucky devil, but perhaps not so lucky. I take a quick peep at him as he passes. He looks dead to me and as if he had died in a horrible way. I am sorry I looked, I should have had a towel over my eyes. Here we are now at the annexe. It smells terribly of ether or chloroform. The anæsthetist comes and says, "Well old man, you should be asleep by now," and I agree. He puts the mask on my face and the smell of the rubber nearly makes me vomit. My sense of smell seems very acute and this stuff smells awful. It is choking me and I am going round and round. I can hear someone talking in the theatre, Now the anæsthetist is talking to the nurse. His voice seems to boom as if amplified. I wish the nurse would hold my hand. It seems childish, but there you are. Now someone is gripping me tightly, as if I was going to run away. I wish they would not do it, I want to sleep and forget. The doctor is telling the nurse about the chap in the next bed to me. He thinks I cannot hear him, but I can, although I feel miles away from my body now. I am sorry poor old Smith is a gonner, or as near as no matter. I hope I won't be in the same boat. I am floating in the air now and I am going up and up and up and then I am in my bed, the nurse is giving me a cup of tea and it is the next day.

* * *

It is somewhat humbling to human intelligence to have to admit that a large number of man's discoveries, especially in the medical sphere, have been made by mere chance. From Dr. Jenner's chance listening to milkmaids' gossip to Professor Gye's chance cold man has stumbled on rather than stalked his scalps. And yet, in the matter of these bacterial, mycotic and virous antagonisms, if we had sat down and considered, if we had cast our eyes back to the ages when man was in the womb of time, to the millions of hot, humid, Carboniferous years—surely the myocetal Golden Age—we might have guessed that these lowly organisms had fought out their quarrels and formed their various spheres of influence, offensive and defensive alliances, toxic attractions and repulsions, miasmal and chemical preferences, all these, long, long before their new food, Man, strutted Lord of All. And if, after the manner of the American tournament, we play one against the other, *Staphylococcus aureus* v. *Aspergillus niger, Penicillium pulchrum* v. *Bacterium gloriosum*, and so on, each playing each, then after a lot of trouble in a lot of laboratories, even more than is caused to the poor secretary by our local tennis tournament, we might get a pretty good idea of the hatreds and friendships, the cliques and discordances, in this vast village microscopic life.

One's imagination rebounds from contemplating the scene of petty strife to one of truly Wellsian proportions—the Great Health House in the capital city of the World State. We are in the Map Room; one of the many map rooms. On the wall is the score board of a huge tournament. All the diseases are playing each other in or on man; their names are written horizontally and vertically, and the dots on the squares show the frequency of their contests. The scarlatina-diphtheria squares, for instance, are almost spotted out, the spots are confluent, they get on splendidly together, but the spirochætal players of yaws and syphilis won't play, a cousinly hatred, so the squares are blank. The mumps-typhoid squares are . . . The telephone rings. A case of amœbic dysentery has occurred at Chowchu in a Chinaman who harbours an old *Tænia lonlium.* "H'm, that ought to be interesting," says the Head Referee and rings up the transport plane to take a team of skilled observers to witness the contest.

Do we know what effect mumps has on typhoid, if any, on *Tinea versicolor,* a mere dermal pet, on the killer of poliomyelitis? One would hardly think they had any effect at all on each other, but do we know? One would hardly think that the sores on the dairymaid's fingers would have any effect on the dreaded smallpox; it seems, on the face of it, a silly idea. The fact is that in many cases we do not know how or if diseases interact, but by keeping a record of the coincidence of diseases for a number of years in a large population, more or less on tournament lines, by noting those squares which statistically one might have expected to be moderately immaculate becoming spotty, and, more significantly, those squares which one might have expected to be spotty keeping immaculate, we have a way of finding out.

* * *

"Se-ipsic is a first-class word," and I feel greatly encouraged. Would this not form an excellent motto for our postwar College of Terminology—or should it be Terminopathy, or rather Terminopathology? My teachers used to talk about the musculospiral and external popliteal nerves among themselves, but to us about the radial and peroneal. Wearied with war, we find them now permitting unrestricted interbreeding of those diverse terminologies—but, let me see, is the peroneal external or medial? I have no book but I believe it is the lateral boundary of the popliteal fossa. Se-ipsic!—yes, that truly should be in basic English. Ordered confusion! Russia, one contributor tells us, is out to graduate 25,000 doctors a year; but do they all have to learn three terminologies in one subject alone? Yes, se-ipsic *must* be our motto. The midwife may treat my pneumonias, but she will never know three names for everything, and even Osler did not learn the BNA and the Birmingham Revision. Happy day! A mustard plaster may not have helped over the serratus lateralis, but if I put it over the serratus anticus, or better the serratus magnus—well, who knows? Se-ipsic!

* * *

A Ministry of Health psychiatrist says that a large number of colds are emotional in origin. Now we see it all. The common cold, a running from the nose, is really the Superego pouring cold water—and mucus—on the erotic zone of the mouth, probably because the Id has been telling low stories, and the husky and altered voice are to prevent it telling any more. When a cold spreads round a family, office or school, that is just another example of mass hysteria.

* * *

Telephone Q: "Doctor, they say this is 2-day 'flu and I've had it for 4 days. Why is that?"

Ditto A.: "I expect you've had it twice." (Hangs up).

Parliament

ON THE FLOOR OF THE HOUSE

MEDICUS MP

THE House has now had three days of general debate on the address, one day devoted to the release of Sir Oswald Mosley, and is now considering amendments which raise vital questions of policy. The grand inquest of the nation is in progress.

Mr. Oliver Lyttleton, in his reply to the general debate on the third day said, "We know the victory is certain, and we think it is imminent, but we are not expressing an opinion in point of time." The order of priority in our postwar problems which Mr. Lyttleton laid down was first, housing and town and country planning, second social security, and third war production in reverse. O[illegible] deterioration of h[illegible] bour for repairs, is [illegible] In rural areas the problem is [illegible] The [illegible] ted. [illegible] ding [illegible] the [illegible] y of [illegible] stry [illegible] immediate problem is [illegible] be the erection of houses to meet temporary or emergency conditions and for this [illegible] ilding are being tried. The [illegible] three or four months eight or [illegible] would be on view. The long [illegible] employment of a labour force [illegible] ,000 over a period of twelve years.

It seems unlikely that there will be acute unemployment for some time after the war, for there will be a vast demand for consumer goods—textiles, clothing, boots and shoes, [illegible] and [illegible] labour [illegible] with [illegible] anger not always appreciated. For there will be, outside this country, a prodigious demand for consumer goods and capital goods. In devastated areas UNRRA will function. But rigid control will be necessary to see that a whirlpool of inflation outside these islands does not pull [illegible]

[illegible] edical profession, asked whether it was [illegible] involved altering the numbers of those [illegible] comprehensive medical service" from 18 [illegible] esent insured population, to over 41 [illegible] a large administrative problem and it is [illegible] Mr. Willink cause for thought.

[illegible] Si[illegible]

[illegible] beginning of a new session the Home Secretary could not be asked questions till the day after the Mosley debate. This made it impossible to get much information. The actual wording of the doctors' report showed clearly it had reference to previous expressions of opinion. It is widely felt that a short medical history of the case with a record of the opinions expressed and of the reasons for the examination this year would be useful and desirable. In the course of his statement, Mr. Morrison said that Sir Oswald Mosley had suffered from recurrent attacks of phlebitis during his detention at Brixton and Holloway, but that up to June, 1943, these gave no serious cause for anxiety. The authorities then "felt [illegible] he phlebitis but also about [illegible] eight had fallen continu[illegible] phlebitis was extending." Hence a fur[illegible] from Hollo[illegible] [illegible] a statement on any factors [illegible] all prisoners, is certainly desirable if the case is to be fully understood. It was urged in the debate that adequate medical and nursing services ex[illegible] outside the [illegible] for Sir Osw[illegible]

ROYAL COMMISSION ON POPULATION

ON Dec. 1 Mr. C. A. ATTLEE, Lord President of the Council, made the following statement in the Commons: The Government have decided to set up a Royal Commission to investigate the birth-rate and trends of population and the Lord Chancellor has accepted the chairmanship. The other members of the Commission will be announced as soon as practicable. The terms of reference will be as follows:—

"To examine the facts relating to the present population trends in Great Britain; [illegible] the causes of these trends and [illegible] consequences; to consider what [illegible] taken in the national interest to influence the future trend of population; and to make recommendations."

The Government have also decided to set on foot immediately a number of inquiries of a technical kind. The exact scope and character of these investigations will be determined in consultation with the chairman of the commission. The results will, of course, be made available to the commission as soon as possible and it is expected that in the meantime the commission will find it practicable to explore and take evidence upon the more general issues connected [illegible]

The D[illegible] ment in [illegible] in the L[illegible] under which the technical issues must be examined. There was first the *statistical* group which was a matter of simple collection of figures and calculation, but involved a high degree of expert knowledge to sift the various statistical factors, assess their significance and to project them into the future. Then there were the *medical and biological* factors, ranging from immediate physiological conditions that may interfere with fertility to remote biological factors that may have far-reaching and deep-seated causes. But in spite of this diversity it had been thought advisable to allocate the work of technical inquiry under this head to one group which can, if necessary, divide itself up to consider the various technical details. There were also *economic* factors—what part they have played in population trends, the part they may still be playing, and what may be the effects of the population trends on our economic life in the future.

QUESTION TIME

Second Rushcliffe Report

Replying to a question, Miss F. HORSBRUGH announced that the Minister of Health had received this report, which deals with male nurses in hospitals, with nurses employed in the public-health services, with [illegible] work, and with trained nur[illegible] Minister had communicated [illegible] Hospitals Association, and t[illegible] Nursing commending to them the recommendations as to salaries, emoluments, and conditions of service, and informing them of the grant which is payable, as in the case of the previous report.

Patulin

The Medical Research Council have accepted an invitation to undertake the organisation of controlled clinical trials of patulin on a considerable scale, and arrangements are in hand for instituting these immediately. For the time being the use of patulin in the treatment of the common cold must be regarded as still in the experimental stage. The preliminary trials have not given consistent results, although some of these have been promising, and it is uncertain what value the drug [illegible] arily take some [illegible] is point, and as [illegible] proper dosage, [illegible] can be used with safety. It would be inadvisable to take steps to make patulin generally available until there is sufficient evidence on these questions. (Miss HORSBURGH replying to Colonel ARTHUR EVANS.)

Infant Mortality in Scotland

Mr. D. KIRKWOOD asked the Secretary of State for Scotland if he was aware that the rate of infant mortality among the poorer classes had, according to recent medical statistics, been since the last war the highest in the civilised world; and what steps he was taking to remove this disgrace from the social life of the country.—Mr. T. JOHNSTON replied: According to the latest information available to me, the Scottish figures, bad as they are, are not the highest even among the nations of Western Europe. The causes of the variations in these infant mortality figures are not always apparent, but a report on the subject by a committee under Sir John Orr's chairmanship, set up at my request by the Scottish Scientific Advisory Committee in June 1942, will shortly be published.

Mr. KIRKWOOD: Is the Minister aware that the child death-rate in Glasgow is higher than it is in Tokyo?—Mr. JOHNSTON: Figures for 1936 relating to the cities of Glasgow and Tokyo are to the effect stated. But the official statistics published by the League of Nations show that, for the five-year period 1934–38, the infant mortality-rate for the whole of Japan was half as high again as for Scotland.

The steps we are taking to deal with this matter are, first to find out what are the deficiencies in the way of homes, housing and so on—to find out what were the causes of it. The Orr Committee was set up for this purpose, and the report is now in hand and I expect it will be published.

Pulmonary Tuberculosis in Scotland

Mr. H. McNEIL asked the Minister if he would give the number of new pulmonary tuberculosis cases notified between June 1, 1943 and Nov. 1, 1943; and the numbers for the comparable periods in 1942, 1941 and 1940, and Mr JOHNSTON replied: Notifications between June 1 and Nov. 1, 1943 were 3073. The corresponding figure for the same period in 1942 was 2633, in 1941 2361, in 1940 2118.—Mr. McNEIL: Will the Minister now agree, from the figures he has supplied, that his scheme for dealing with tuberculosis by excluding chronic sufferers has obviously failed to restrict the spread of infection in the country?—Mr. JOHNSTON: The two things have no necessary connection whatever.—Mr. McNEIL: Will the Minister tell me to what he attributes the increase since he thinks he has cut out an area of infection? Mr. JOHNSTON: My honourable friend asked for statistics going back to 1940. The scheme to which he alludes now is another matter altogether. It is dealing entirely with war-time temporary conditions.

Industrial Training of Disabled Men

Mr. W. A. BURKE asked the Minister of Labour, if he was aware that men were being discharged from the services on medical grounds and entering civil employment for which they were physically unfit, and would he make arrangements for all men discharged from the services to be interviewed at an employment exchange for the purpose of receiving explanations of rehabilitation and training schemes.—Mr. E. BEVIN replied: The arrangements for interviewing men from HM Forces on medical grounds or because of disablement include interviewing at hospitals and other invaliding establishments as well as at employment exchanges. Steps are taken by means of reports and discussions to get expert medical advice as to the individual's condition, and as to the most suitable kind of occupation. All local offices of the Ministry have full particulars of the training and other schemes designed to assist the satisfactory resettlement of persons suffering from any form of disability—whether as the result of service with HM Forces or from other causes.

Social Security Proposals

Sir JOHN MELLOR asked the Prime Minister which ministers would be specially concerned with the preparation of the Government's proposals regarding an enlarged and unified system of social insurance, a comprehensive health service and a new scheme of workmen's compensation, respectively; and whether any particular member, or members, of the War Cabinet would specially review this work.—Mr. ATTLEE replied: The ministers specially concerned with these matters are the Minister of Health and the Secretary of State for Scotland, the Minister of Labour and National Service, and the Home Secretary. The Government's proposals for social security are being formulated under the direction of a committee of ministers; and the Minister without portfolio has, and will continue to have, a special responsibility for coördinating the work involved in presenting the social insurance scheme as a whole to that committee. As regards the last part of the question, these are matters falling within the scope of the Minister of Reconstruction.

Medical Personnel (Priority) Committee

Sir E. GRAHAM-LITTLE asked the Minister of Health how many times this committee had met during the past 12 months; and what was the date of the last meeting?—Mr. H. WILLINK replied: The committee has held seven meetings during the past 12 months, and last met on Nov. 10.

Emergency Medical Service

Sir E. GRAHAM-LITTLE asked the Minister of Health whether he would state the present cost of the Emergency Medical Service and the number of salaried medical practitioners engaged; and whether, as this service was planned more than four years ago to meet events which had not happened and had resulted in a redundant supply of doctors to hospitals and districts remote from towns and to small specialists staffs at voluntary and teaching hospitals, especially in London, and withdrawing adequate medical attendance from the civilian population whose illness risks had at the same time increased, he would immediately readjust the distribution of medical man-power.—Mr. WILLINK replied: The cost of the salaries, fees and expenses of medical officers enrolled in the EMS is at the rate of approximately £1,200,000 a year, and the number of medical officers receiving whole or part-time salaries, which fluctuates somewhat from time to time, is about 1550. I do not accept the implications in the second part of the question or see any justification for the redistribution of hospital staff suggested. Although the Service has fortunately not been called upon to treat so many casualties as was at one time expected, it has been employed in caring for the numerous other classes of patients brought within the scope of the EMS. Among these classes are large numbers of civilian sick transferred from town hospitals to outer hospitals having more adequate facilities for their treatment, and other civilian patients transferred from hospitals with long waiting-lists. In the result the emergency scheme has greatly expanded the hospital facilities provided for the civilian population as a whole and has made specialist medical skill available to much larger numbers of patients than ever before.

National Health Service in Australia

Sir E. GRAHAM-LITTLE asked the Minister of Health whether he was aware of the successful protest made by the Federal Council of the British Medical Association in Australia against the attempt made by the Federal Government to bring about the nationalisation of the medical profession in Australia on much the same lines as had been proposed for Great Britain in speeches by the ex-Minister of Health, and whether he would apply the argument put forward by the Australian Association also to this country, that it was unjust to make plans for the medical profession while many doctors serving in the forces could not make their views heard.—Mr. WILLINK replied: I am alive to the importance of enabling doctors in the Forces to see for themselves what the Government's proposals are, and to discuss them and express views on them before legislation is undertaken. That is one of the objects of the forthcoming white-paper.

Mosley's Release

Replying to questions on medical reports on Sir Oswald Mosley, Mr. H. MORRISON said the reports which he had received did not include any estimate of the length of treatment which might be needed to guard against an extension or recurrence of the condition from which Sir Oswald Mosley was suffering, and he was advised that it would be premature to express any opinion on the point. As he had explained, he would have no hesitation in ordering immediate detention, irrespective of any medical considerations, should he come to the conclusion that the interests of national security so required.

Lord Dawson of Penn had suggested that it would be helpful if the prison medical authorities would confer with himself and Dr. Geoffrey Evans, both of whom had attended Sir Oswald Mosley as their private patient, or, alternatively, with two other doctors of equal standing. As Lord Dawson and Dr. Evans had already examined Sir Oswald Mosley and were in a position to judge the progress of the disease, the prison

Continued at foot of opposite page

Letters to the Editor

PROFLAVINE IN CLOSED WOUNDS

SIR,—Russell and Falconer and also Hawking report necrosis of muscle after sewing up wounds in animals treated with proflavine. Lieut.-Colonel Ian Fraser, RAMC (personal communication), found that in two fully debrided wounds where there was little exudate, no pus and no granulation barrier, considerable necrosis of deep tissues and gangrene of the skin edges took place after ·5 g. of proflavine had been inserted and the wounds closed without drainage. On the other hand, a small series of wounds treated with 1% proflavine mixed with sulphathiazole closed up and healed by first intention.

We treated about 300 old septic but open wounds with much smaller quantities of proflavine (average 0·5 g.) and we never saw any necrosis; however, an eschar as already described was frequently found. We also used smaller quantities (average 0·1 g.) of proflavine in conjunction with 10 g. sulphanilamide in 11 compound fractures which were later closed up; there were no harmful effects. In the original cases the proflavine was used without neutralisation but latterly 0·25 g. of bicarbonate has been added to each gramme of proflavine.[1]

It appears that proflavine should only be used in open wounds and not more than 0·1–0·5 g. should be used at one time. Pending an adequate supply of some more satisfactory substance (e.g. penicillin), it seems that proflavine is the best drug available for the treatment of such wounds when they are infected with staphylococci or are purulent. Proflavine may possibly be of some value in gas gangrene when applied locally, but the number of cases treated is so small that again we cannot draw definite conclusions.

G. A. G. MITCHELL.
Base Transfusion Unit, MEF. G. A. H. BUTTLE.

MINIATURE RADIOGRAPHY

SIR,—An important issue I raised at the meeting of the radiological section of the Royal Society of Medicine on Nov. 19 did not seem to be fully answered by any of the four opening speakers, although three of them admitted the importance and difficulty of my submission. Briefly the question was this.

The medical officer of a certain factory has complained that when the mass radiographic unit of the Ministry of Health visited the factory, the medical officer in charge of the unit erected an extraordinary barrier of professional secrecy, and refused to convey any information regarding the positive or suspect cases to the patients themselves. Worse however was the fact that he did not propose even to tell the factory medical officer when a case was positive. The factory medical officer points out to me that this is a bad policy and that he is under the same responsibility regarding medical secrecy as any other doctor. He or she is only entitled to convey information regarding disease in members of the factory to the managing director, or his nominee, where it is a matter that affects the health of the factory workers generally, or the individual's efficiency. Tuberculosis is a case in point, but it seems rather nonsensical to carry out mass radiography on a large number of employees if the factory medical officer is not to be in a position to advise employees in the light of the findings.

One of the opening speakers explained that any information about a positive case could only be conveyed to the patient's private doctor and that this decision had been reached after consultation with the Trades Union Congress. Further it was pointed out that if an employee in a factory was found to have pulmonary tuberculosis, and after being informed refused to receive treatment, then as the law stands we are powerless to enforce treatment. Thus if such an employee is working in a factory producing proprietary foodstuffs he can continue his work, while the factory medical officer is kept in ignorance of the facts, and perhaps his private doctor may decide to watch him rather than notify the case. Meantime the other factory workers and the general public are to suffer and possibly become infected from the food this tuberculous individual is handling. Surely something must be done about this.

It is satisfactory to note that at last instead of bringing the workers to the units the units are being taken to the workers, as I have advocated since 1930. Nevertheless, large numbers of stationary or static centres will have to be created for the other millions of the population who are not conveniently centralised in factories. This part of the scheme I feel will eventually evolve itself around a regional organisation with perhaps 8 regions to cover Britain and boards of experts (physicians and radiologists) for examining the miniature films attached to each region. The suggestion of training medical officers of health to "spot disease" on miniature films, like young boys train themselves to spot different types of aircraft, must sooner or later bring discredit to this important field of chest radiology destined to revolutionise social medicine.

The latest official figure of the number of cases examined per unit is 1500 a week, so that one unit working for 40 weeks can only cover 60,000 subjects in twelve months. At this lamentably slow rate it would require over 650 units to cover the population of Great Britain in a year. To examine Greater London with one unit I once over-optimistically indicated a term of 80 years, but this will now have to be extended to over 133 years!

London, W.1. NORMAN P. HENDERSON.

POLYONYMY

SIR,—It is already difficult for the general physician or surgeon to keep pace with the discovery of therapeutic derivatives of moulds. It will be impossible if they receive multiple names. What just reason can there be for issuing patulin under the brand name of tercinin? Why should the prestige of a British product be halved by an alias?

CORYZA.

*** The brand name 'Tercinin' was applied to anhydro-3-hydroxymethylene-tetrahydro-γ-pyrone-2-carboxylic acid by the Therapeutic Research Corporation and registered by them when they undertook its manufacture. It seemed undesirable to adopt a trade name in the account of the collaborative research on this substance, and the chemical name was inconveniently long; a second, non-proprietary, name was therefore adopted. Multiple names might be avoided if anyone about to introduce a new drug which is likely to come into fairly general use would apply to the nomenclature committee of the British Pharmacopœia Commission for a name or approval of a name.—ED. L.

DOMESTIC SERVICE IN HOSPITALS

SIR,—Professor Nixon writes of hospitals situated in the centre of a city with all sorts of amusements near at hand. These are, of course, in a much happier position regarding domestic staff than are sanatoria isolated in the heart of the country. But at the Cheshire Joint Sanatorium, although the shortage has made relief for holidays and sickness none too easy, we have been lucky enough to keep a faithful skeleton staff together and so always managed to carry on. The staff social and athletic club provides opportunities for [illegible] key,

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[1] Albert, A. and Gledhill, W. *Lancet*, 1943, ii, 238; and *Pharm. J.* Sept. 4, 1943, p. 87.

Continued from previous page

medical authorities welcomed this suggestion and decided, with my approval, to take Lord Dawson and Dr. Evans into consultation. The question of fees for the two consultants out of public funds had not yet been raised, so far as he was aware. No question of fees arose in the case of the prison medical authorities.

Cholera in Bengal

Replying to a question on the food situation in India, Mr. AMERY added: A serious outbreak of cholera in Bengal has followed upon the famine. During October deaths in the province from this disease averaged 5349 per week. In the first week of November they were 4404. Assistance in the provision of doctors and medical equipment is being provided by the Army and a mass inoculation campaign is being planned. Some drugs are being flown from this country.

tennis, badminton), swimming (there is a pool in the grounds), dancing, shooting, amateur dramatics, concerts, cinema shows and language studies (refugee nurses have taught French and German). As members of the club, domestic staff, when off duty, have equal status with medical and nursing staff.

Since a scheme for the training of maids has been tried out at the sanatorium the junior domestic staff have been treated as domestic science students. A certificate of elementary domestic science training is awarded to those who satisfactorily complete a two years training and possessors of the certificate are eligible for promotion to the rank of assistant housekeeper. Assistant housekeepers receive a salary of £105 with full residential emoluments and enjoy the same off-duty privileges as staff nurses. All domestic staff wear a Ministry of Health Hospital Service badge.

Cheshire Joint Sanatorium,
Market Drayton.

MARIE A. SIMPSON,
Matron.

MULTILINGUAL MEDICAL PHRASE-BOOK

SIR,—With reference to your peripatetic correspondent's suggestion in the *Lancet* on Nov. 13, I have already prepared a phrase-book on similar lines and the phrases have been translated through the kindness of foreign doctors into 26 languages. The cost of printing is estimated to be high on account of the numerous kinds of special type required; and I have so far been unsuccessful in finding anyone willing to make a grant towards the cost of publication. The text of my "Polyglot Medical Questionnaire" is specially devised for obtaining medical histories from patients who do not speak the same language. The system adopted for communication between patient and interrogator is quite simple and incidentally dispenses with the necessity for spoken words. By this means it should be possible for a doctor or nurse, with no knowledge of the patient's language, to obtain an adequate clinical history.

Liverpool. S. CHALMERS PARRY.

*** The Norwegian Red Cross have sent all the principal hospitals in Great Britain a questionnaire in Norwegian and English which enables Norwegian patients who cannot speak English to explain their complaints and needs.—ED. L.

EXOPHTHALMIC GOITRE AND PEPTIC ULCER

SIR,—In his interesting paper in your last issue, Dr. Halliday mentions peptic ulcer as associated with exophthalmic goitre and quotes A. T. M. Wilson to the effect that "exophthalmic goitre may precede the onset of peptic ulcer but apparently seldom follows it."

In my experience association of the two diseases is extremely uncommon, either as a simultaneous or sequent event. This, I think, is borne out by considerable clinical and experimental work summarised and supported by Louis and Wills (*Quart. J. Med.* 1937, 30, 353) showing that most patients with thyrotoxicosis have achlorhydria or hypochlorhydria, although normal acidity may return after thyroidectomy. Furthermore Dr. Halliday's brief descriptions of the personalities underlying duodenal ulcer and exophthalmic goitre do not correspond very closely. The former is described as showing "a sustained relentless application associated with obsessional and compulsive drives" while the latter is "nervous, impatient, irritable, tending to violent emotions." Nevertheless it is gratifying to see increasing emphasis laid on the underlying constitution in diseases and in exophthalmic goitre in particular.

Department of Medicine,
University of Cambridge.

LAURENCE MARTIN.

MESSRS. MAY and BAKER LTD. have introduced a new preparation of 3-amino-4-hydroxy phenylarsine oxide (arsphenoxide) for the treatment of syphilis and other infections susceptible to neoarsphenamine. This new product, 'Neo-Halarsine,' is arsphenoxide tartrate, and among advantages claimed for it are that the active material is a pure crystalline substance and that solutions can stand for at least 8 hours without discoloration or increase in toxicity. A preparation of arsphenoxide named 'Halarsol' was issued in 1930 by the same firm for the treatment of yaws.

Obituary

ERNEST CHARLES LINDSAY

CBE, B SC NZ, M B LOND., F R C S

Fall, London

Charles Lindsay, surgeon to the London Hospital, died suddenly on Oct. 23 from coronary thrombosis. He had returned to work after an almost fatal attack 18 months ago. Cheerful equanimity in the face of illness and its threats had long been one of his characteristics.

He was 60 years of age and the son of the Rev. George Lindsay of Christchurch, New Zealand. After taking a science degree at Otago he came to England for his medical course and qualified in 1909. A series of house appointments at the London Hospital followed; he became FRCS in 1912 and was surgical registrar at the hospital. After war employment in the RAMC as a surgical specialist, for which he was made CBE, he went back to the London where he became assistant in the surgical unit and was elected to the staff in 1920. He soon won recognition as a thoroughly capable general surgeon with good judgment and—as befitted a pupil of James Sherren—special knowledge of the upper abdomen. He wrote useful papers on pulmonary embolism and postoperative acidity and collaborated with the late W. S. Perrin in an important monograph on intusssusception. His patients recognised him as entirely trustworthy: his house-surgeons and dressers found him always helpful and kind; and his teaching was sound and clear. Former students will remember his stocky figure, his merry eye, and his tidy mind which could classify and tabulate neatly in a manner very useful to prospective examinees. He was himself an examiner at Cambridge and Belfast universities.

Mr. Lindsay gave long service to the Poplar Hospital and the Freemasons Hospital as well as to the London. In the intervals of a busy professional life he found time for music, gardening and golf. He married, in 1921. Mrs. Mae C. Davies, who survives him.

RICHARD KENNY LEVICK

M B CAMB, MRCP; CAPTAIN RAMC

Captain Richard Levick, who was killed in Italy during October at the age of 33, was younger son of the late Dr. G. K. Levick of Havant, and brother of Dr. P. K. Levick of Bungay. He was educated at Epsom College. Christ's College, Cambridge, and St. Bartholomew's Hospital. He took his degree in 1934 and after holding junior house-appointments at Bart's he spent eighteen months at the Norfolk and Norwich Hospital and six months at Addenbrooke's, where he came in contact with Professor Ryle and became an assistant in the department of medicine at the university. Then he worked for Dr. Russell Brain at Maida Vale, and took his MRCP. Later while at Great Ormond Street, he was awarded a studentship at Cambridge for two years, but the outbreak of war postponed this and he went back to Ormond Street as resident assistant physician until after the raids of 1940 when he was put in charge of the annexe at Hemel Hempstead. A friend writes:

Levick was at his best with children who took confidence at his friendly, serious and unaffected approach. During his years at the Hospital for Sick Children, he became more and more absorbed in his work, even to the exclusion of normal leisure but he was always grand at a party and was famous for his hearty laugh, and he was a mighty hitter on the golf course or tennis court. His outstanding traits were thoroughness and modesty. His case-taking was never hurried and his notes models of fullness and accuracy. Neither long lines of patients nor anxious assistants could shake him into a hasty decision: and in wards or outpatient department he could never be persuaded to watch the clock. Based on careful observation his judgment was sound but often more highly valued by his chiefs and colleagues than by himself.

In June, 1942, Levick received his commission with the RAMC and became physician to a casualty-clearing station. With his unit he landed in Sicily and later crossed to Italy where he was killed when the lorry in which he was travelling went over a cliff. He married in 1940 Miss Jessie Phillips, a ward sister at Great Ormond Street, and leaves her with a daughter.

ALAN GRAHAM PORTER

MB CAMB; MAJOR RAMC

Major Alan Porter, who has been missing since September, is now reported to have been killed in action in the central Mediterranean area. He was born in 1915, the son of Dr. Alexander Porter of Dovercourt, Essex, and educated at St. Edmunds, Ware, and Caius College, Cambridge. He took honours in the natural sciences tripos in 1937 and went on to St. Thomas's where he won the Myers prize in psychology. Porter *graduated MB in 1910 and* returned to Cambridge as a house-physician at the emergency hospital. On joining the RAMC in 1911 he was attached to the field ambulance with which he remained till his death. For over a year he was adjutant and soon after he went abroad in 1912 he became company commander and this year he received his majority.

Nawrasl, India

M. C. M. writes: "Alan Porter proved himself a keen and competent clinician, quick to seize upon an interesting point of any case and revelling in the uncommon ones. Two [illegible] especially his cheery personality and never-failing sense of humour."

Dr. Porter married in 1938 Miss Olive Stanley, a graduate of Newnham College, and they had one daughter.

KENNETH PERCIVAL MORRISON

MB ST. AND.; CAPTAIN RAMC

THE death of Ken Morrison in West Africa came as a shock to his friends, for news from him was good and he had entered foreign service with characteristic zest. Ken was always rather shy and diffident, but among those he knew he expressed his well-considered opinions with freedom. Brought up in a home where internationalism was encouraged his outlook was broad, even in his early years at Madras College, St. Andrews. When his school [illegible] take and next year joined the faculty of medicine. He was an outstanding student and graduated in 1910 when still only twenty-three. After holding house jobs under Professor Patrick at Dundee Royal Infirmary and under Mr. Wilson Hey at the Manchester Royal Infirmary Morrison returned to *Dundee* to work with *Professor* Cappell in the department of pathology. In 1912 he joined the RAMC and was with an armoured guards division until he was wounded on Salisbury Plain in April, 1912. When he returned to duty, after a service pathology course, he was posted as pathologist first to the Orkney and Shetlands command and later to a general hospital in West Africa. He had an inquiring mind and was tireless in his search for an answer, and those who knew him best believed he was one of the "would have beens" of medicine. In 1911 he married Miss Mary Clark of Dundee who survives him. J. G.

Polyfoto

Public Health

Outwitting the Rat

A PRINCIPLE in the art of ratcatching is to lull the rats into a mistaken feeling of security. On Dec. 10 Greater London rats are being attacked in 3000 miles of sewers by the Ministry of Food and its infestation division. Since October the public have been asked not to kill rats but to notify the local authority whenever they saw one. Dr. M. T. Morgan,[1] medical officer of health to the Port of London, advocates a scheme of prebaiting, poisoning *and postbaiting which aims at total elimination of rat* colonies, not at "skimming the cream off *a permanent* establishment," and these methods are being followed. Baits containing no poison were put down on Dec. 7, 8 and 9 so that by the third day the rats were taking them confidently. On Dec. 10 poisoned baits are being used, and gassing may also be tried. In a test made at Kensington, poisoned bait was laid at one of the six entrances to the main sewer, and 6000 rats were killed at that point alone. In a scheme appropriate for docks, wharves, warehouses and farm premises, Dr. Morgan *notes that zinc phosphide, arsenious oxide, barium* carbonate and red squill—if you can get it—are reliable poisons. He finds that sausage rusk (the basic filling of sausages), whole wheat soaked for 24 hours and then drained, and bread mash are good baits; they should be inspected and renewed daily and notes should be kept of the amounts taken. On the day of attack all unpoisoned baits are cleared away, and poisoned baits are put down. The kill is estimated by postbaiting. About a week after the poisoning the old sites are baited again with unpoisoned food of a different type from that already used; rats are suspicious of bait which they associate with danger. If there is any taken, the new bait is poisoned after a day or two with a different poison.

Infectious Disease in England and Wales

WEEK ENDED NOV. 27

Notifications.—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 3157; whooping-cough, 1800; diphtheria, 732; paratyphoid, 2; typhoid, 0; measles (excluding rubella), 518; pneumonia (primary or influenzal), 1617 (last week 981); puerperal pyrexia, 166; cerebrospinal fever, 43; poliomyelitis, 13; polio-encephalitis, 1; encephalitis lethargica, 4; dysentery, 147; ophthalmia neonatorum, 75. No case of cholera, plague or typhus fever was notified during the week.

[illegible] of civilian and service sick in the Infectious Hospitals [illegible] on Nov. 24 was 1973. During the [illegible] cases were admitted: scarlet fever, [illegible] 17; *whooping-cough, 49.*

Deaths.—In 126 *great towns* there *were no deaths* from enteric fevers or measles, 5 (0) from scarlet fever, 16 (3) from whooping-cough, 15 (1) from diphtheria, 39 (5) from diarrhœa and enteritis under two years, and 375 (29) from influenza. The figures in parentheses are those for London itself.

The number of stillbirths notified during the week was 191 (corresponding to a rate of 33 per thousand total births), including 18 in London.

Influenza

The number of deaths in the great towns from influenza has risen steeply during the last three weeks. The returns for Nov. 20 showed 106; for Nov. 13, 46; for Nov. 6, 31. Of the 375 *deaths reported for* Nov. 27 there were 71 in Greater London but no town in the south-eastern area had more than 4 fatal cases, with the exception of Oxford (6). In the northern area there were 172 deaths (*14 in Manchester*, 17 in Bradford, 11 in Liverpool and 10 in Bolton) and the Midland area had [illegible] (20 in Birmingham, 18 in Bristol and 11 in Nottin[illegible]);

Notes and News

FAMINE

THIS little book[1] is based upon the experiences of the Quaker relief unit working in Buzuluk during the Russian famine of 1921–1922. Buzuluk is about 100 miles east of Kuibishev, and before 1921 was a town of some 30,000 inhabitants and a centre of the grain trade. In 1921 it became the site of an appalling famine, and was chosen by the Society of Friends for their relief operations. To say that this book is good is understating the case. The writing is quite dispassionate, and it is packed full of practical experiences, which may well prove to be invaluable to other relief expeditions likely to be setting out from this country and America within the next 12 to 18 months. Only a few of the points can be mentioned. The dangers of centralising relief operations are explained: it led to such an influx of starving populations from the rural areas that the centres were overwhelmed. The rigid discipline required of relief workers is emphasised. It is no good giving away food indiscriminately. It is useless to feed anyone out of a compassionate impulse. People should only be fed who can go on being fed, and who are likely to be useful members of society if they survive. It is useless to try to save all the children at the expense of the young adults. First, last, and all the time, the personnel of the relief units must be well fed, well clothed, and well cared for. The importance attributed to cereals in famine relief is an interesting point. Every page contains a valuable hint for a future expedition, whether it be a mistake, frankly admitted, or an arrangement, mentioned in passing, which made all the difference between success and failure.

Royal College of Surgeons of England

The council has decided to proceed without delay to make an appointment to the chair of human and comparative pathology instituted under the gift made to the college by Mr. W. H. Collins. A board of advisors has been appointed, consisting of six members of the council and the president of the Royal Society, the secretary of the Medical Research Council, the acting regius professor of physic in the University of Cambridge, and Prof. J. Shaw Dunn of Glasgow. Details of the appointment will be announced soon.

Royal Society of Medicine

A meeting of the section of psychiatry will be held on Tuesday, Dec. 14, at 2.30 PM, when Dr. Joshua Bierer will read a paper on a new form of group psychotherapy. On Dec. 15, at 2.15 PM, at the section of comparative medicine there will be further discussion on the limitations and uses of the comparative method in medicine. Mr. M. A. C. Hinton, FRS, and Dr. H. Gruneberg will speak on animal ecology and genetics respectively. On Dec. 16, at 3.30 PM, there will be a joint meeting of the sections of dermatology and epidemiology and State medicine. Dr. F. S. Airey, Dr. Arthur Burrows, Sir Henry Gauvain and Dr. Fredk. Heaf will open a discussion on the organisation of the treatment of lupus vulgaris.

Medical Society of London

On Monday, Dec. 13, at 4.30 PM, at 11, Chandos Street, W.1, Dr. A. L. K. Rankin will read a paper on diphtheria, Dr. R. E. Smith on mumps, and Dr. Norman Begg on chickenpox

British Institute of Radiology

A meeting of medical members will be held on Friday, Dec. 17, at 2.30 PM, at 32, Welbeck Street, London, W.1. On Dec. 18, at the same hour, Dr. F. H. Kemp will speak on chronic intussusception in children, and Mr. G. L. Rogers, PH D, on instantaneous stereography.

Medical Casualties

Lieut.-Colonel M. J. Kohane, MC, LRCPI, RAMC, and Surgeon Lieut.-Commander S. W. Maxwell, MB LOND., RNVR, have been posted as wounded.

BLACKCURRANT puree and syrup are now again on sale at retail chemists for children up to 16, invalids and others in need of extra vitamin C.

The fact that goods made of raw
to war conditions are advertised
as an indication that they are

Population Problems

At a meeting of the Eugenics Society on Tuesday, Dec. 14, at 5 PM, at the rooms of the Royal Society, Burlington House, Piccadilly, London, W.1, Dr. J. A. Fraser Roberts will discuss population problems in the light of differential fertility.

Faculty of Radiologists

At the recent examination for the fellowship F. M. Abeles and W. Tennent were successful.

Society of Chemical Industry

At a meeting of the agriculture group on Tuesday, Dec. 14, at 4 PM, at Burlington House, Piccadilly, London, W.1, Mr. S. J. Watson, director of research at Jealotts Hill station, will speak on livestock deficiency diseases and their treatment.

National Ophthalmic Treatment

From Jan. 1 the board's fee for a medical eye examination to all insured persons will be 15*s*. The service will still be open to others whose family income does not exceed £250 a year, at the old fee of 10*s*. 6*d*. and the cost of glasses will remain as at present.

Ethical Pharmaceuticals Association

The following officers have been elected: chairman, Mr. G. L. Cooper; vice-chairman, Mr. C. W. S. Taylor; members of the executive committee, Mr. J. Angus (Bengue), Mr. R. F. Edkins (Organon), Mr. A. C. Henry (Bayer), Mr. W. Beckley (Zimmerman), Mr. H. R. Napp (Napp).

Lectures on Delinquency

On March 8, at 2.30 PM, Dr. Kate Friedlander will give the first of twelve lectures on the Freudian theory of delinquency, and on Jan. 14, at 6.30 PM, Mr. H. J. Jacoby will give the first of six lectures on the handwriting of delinquents. Tickets from the secretary at the Institute for the Scientific Treatment of Delinquency, 17, Manchester Street, London, W.1, where the lectures will be given.

MOH School Medical Group

At a meeting held at Derby on Dec. 3 it was unanimously decided to revive this group and a temporary committee was formed. All interested, whether or not members of the Society of MOH's, are asked to communicate with Dr. A. A. E. Newth, 28, Chaucer Street, Nottingham.

Births, Marriages and Deaths

BIRTHS

DURBIN.—On Nov. 28, at Byfleet, the wife of Mr. F. C. Durbin, FRCS—a daughter.

EDWARDS.—On Nov. 30, at Bournemouth, the wife of Squadron-Leader A. Glyn Edwards, MB—a daughter.

KENNETT.—On Nov. 25, in Edinburgh, the wife of Surgeon Lieutenant A. W. Kennett, RNVR—a daughter.

MACFARLANE.—On Nov. 29, at Oxford, the wife of Dr. R. G. Macfarlane—a son.

PAGE.—On Nov. 27, at Doncaster, the wife of Dr. Lawrence Page, RAF—a son.

RILEY.—On Nov. 25, at Broadstairs, the wife of Dr. Ronald Riley—a son.

RYAN.—On Nov. 26, at Windsor, the wife of Major Charles Ryan, RAMC (missing believed killed)—a daughter.

SCORER.—On Nov. 29, in London, the wife of Surgeon Lieutenant C. G. Scorer, MBE, RNVR—a daughter.

WARRACK.—On Nov. 28, at Edinburgh, the wife of Lieut.-Colonel G. M. Warrack, RAMC—a daughter.

WILSON.—On Aug. 5, the wife of Dr. H. T. H. Wilson of Mbeya, Tanganyika Territory—a daughter.

MARRIAGES

TRODDYN—SQUANCE.—On Dec. 1, at South Shields, Terence Henry Troddyn, MB, to Mary Elizabeth Squance.

WALFORD—AUERBACH.—On Oct. 25, abroad, Peter Ambrose Walford, MB, RAMC, to Nina Auerbach, MD, of the Public Health Department, Haifa.

DEATHS

AIR.—On Nov. 28, at South Norwood, Samuel Henry Cummings Air, MB LOND., aged 64.

BAYLOR.—On Dec. 1, Edward Arthur Crampton Baylor, MD DUBL. aged 81.

BOND.—On Dec. 1, at Westcliff, Essex, Laurence Temple Bond, MB CAMB.

GUBBIN.—On Nov. 28, at Crewkerne, Somerset, George Frederick Gubbin, LRCP, DPH, lieut.-colonel RAMC retd., aged 86.

HOGGAN.—On Dec. 4, at Liberton, Edinburgh, Robert Hoggan, MB EDIN., JP.

MCLANNAHAN.—On Nov. 28, at Salcombe, Devon, James Gunn McLannahan, LRCP, formerly of Stonehouse, Glos.

RUDKIN.—On Nov. 30, at Fleet, Hants, Gordon Wilfrid Ritchie Rudkin, MC, MB LOND., DPH.

WATERS.—On Nov. 29, at Stone, Dartford, George William Bennett Waters, MRCS.

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[1] Famine (Quaker Work in Russia 1921–23), by Michael Asquith, with foreword by Dr. Melville Mackenzie. (Oxford Univ. Press. Pp. 70. 2*s*.)

HEALTH OF HOSPITAL NURSES*

DONALD M. COURT, M B BIRM, M R C P
ASSISTANT PHYSICIAN, EMS

THERE are about 270,000 nurses in England and Wales and at least 11,000 more are required by hospital authorities to meet existing needs (see *Lancet*, 1943, i, 507). Health is rightly regarded as one index of living conditions, and its importance to the nurse and her profession, the patient, the hospital authorities and the community is self-evident. It is surprising therefore that this subject has been so neglected by our medical and nursing professions. In the past 5 years I found only 60 articles dealing with this subject in medical journals, and only 8 of these were by British authors. During the same period four times as many papers appeared on such a socially unimportant disease as diabetes insipidus. In America much work has been done in isolated hospitals, notably sanatoria, but it was not until 1938 that a comprehensive survey was made, by the American Hospital Association and others.

This paper deals with the health of nurses with special reference to the staff of an EMS sector hospital. This did not exist before the war, so that stability in conditions and personnel has still to be achieved. The numbers under review are small and the liability to statistical error proportionately great. Any conclusions will naturally be tentative and require modification in the light of data from larger groups observed for longer periods. Yet in spite of these limitations, the special importance of the subject at the present time and the absence of more reliable information from other sources in this country seemed to warrant a preliminary report.

THE PRESENT PLAN

I examine the nurses on entering the hospital or training school and record the facts on a standard form. Radiograms of the chest are taken in all cases, together with films of other systems as required. Further examinations and treatment of the teeth, ears, feet, &c., are carried out by the special departments concerned. The heart is screened in all cases where a murmur is present. The urine is examined microscopically wherever a history of scarlet fever, renal disease or urinary symptoms is given. Complete Mantoux and Schick tests are carried out on entry.

In case of illness, a sick bay of 30 beds is available, and all nurses are encouraged to accept treatment there. So far only half have done so, the remainder being treated by their panel doctors. Those accepting resident treatment are first seen by the medical superintendent, who either deals with them himself or refers them to the senior physician or surgeon. Convalescence can be taken at home or at the hospital convalescent home.

TABLE I—PERCENTAGE INCIDENCE OF FINDINGS AT FIRST EXAMINATION OF 385 NURSES

—	Trained	Student	Assistant	Auxiliary
No examined ..	76	96	65	148
(A) HISTORY (%)				
Measles	63	77	54	71
Pertussis	29	24	16	33
Scarlet fever	21	11	10	16
Diphtheria	6	4	6	7
Juvenile rheumatism ..	3	1	1	2
Otitis media	8	2	0	6
Recurrent sore throats ..	5	9	16	11
Tonsillectomy	21	31	28	33
Reason given	4	6	13	8
Asthma	0	1	0	2
Appendicectomy	17	12·5	13·5	10
(B) ON EXAMINATION (%)				
Defective vision	28	38	21	27
Teeth: Very good ..	17	10	26	38
Teeth: Satisfactory ..	60	44	46	40
Teeth: Poor	16	13	15	19
Teeth: Complete dentures	7	3	13	3
Heart: structural disease	1	1	0	2
Menstrual pain: Mild	17	15	19	24
Menstrual pain: Severe ..	2	5	4	12
Menstrual pain: None	81	80	77	64
Varicose veins	5	6	6	10
Foot defects	7	2	6	7
Acne vulgaris	2	14	6	9
Emotional instability ..	0	2	4	2
Raised blood-pressure ..	3	0	2	1
Active tuberculosis .	0	0	0	0
Radiogram of chest—Doubtful shadows ..	4	0	0	2

The [illegible] their illness [illegible] weekly until t[illegible] than 3 days [illegible] h the diagnosis was of necessity made by the patient. It accounted for 6% of the total time lost, distributed between "bilious attacks" and other conditions. Notification as described has resulted in a measure of uncertainty both in diagnosis and control, and an attempt is being made to strengthen this weak link in the chain of supervision by writing to the doctor of any nurse who is absent for more than a week asking him to amplify the information on his certificate and give a provisional prognosis. This letter is, of course, only sent with the nurse's consent. On her return to duty she is asked to see the senior physician, who makes as full an examination as he thinks necessary.

TABLE II—NUMBERS IN DIFFERENT AGE-GROUPS

Age-group (years)	Trained	Student	Assistant	Auxiliary
15–20 ..	0	24	6	18
20–25 ..	14	25	14	17
25–30 ..	16	5	13	8
30–35 ..	12	1	13	7
35–40 ..	12	0	4	5
40–45 ..	6	0	4	3

HEALTH AND SICKNESS 1942

Building the hospital did not begin until 1940 and has only just been completed. The expansion and fluctuation of the staff, inevitable during such a period of rapid g[illegible] very difficult. [illegible] urses initially e[illegible] kness survey (t[illegible] the auxiliarie[illegible] days' intensive training for service in other hospitals. A training school was not established until the end of 1941, so that no student nurses figure in the analysis for that year. In the sickness survey only nurses present for 6 months or longer have been included. This, though an arbitrary selection, only eliminated a small minority of nurses who were present for very short periods. No other selection has taken place, though the 1942 sickness figures are weighted by 4 nurses who together had 600 days' illness. The four types of staff—trained, student, assistant and auxiliary—have in part been analysed separately. The first two constitute established professional groups, "assistants" are about to be recognised, while auxiliaries represent the source of the many recruits which the future will demand.

INITIAL EXAMINATION

The incidence of abnormalities revealed in the history and examination is set out in table I and the age-distribution of the staff is given in table II.

The similarity in the incidence of "fevers" in all groups shows that at least in this respect they are comparable, though the continued presence of diphtheria should be remedied in the near future. There was a high tonsillectomy rate, especially in the younger age-groups, compared with the incidence of recurrent sore throats. The "slaughter of the innocents" still continues, further emphasising Glover's suggestion that in the main tonsils should be removed from the vocabulary and not from the pharynx.

Normal vision was taken as 6/6 or less (Snell[illegible] 32% of visual defects were uncorrected or inade[illegible] corrected when first seen. The criteria [illegible] inadequacy were entirely arbitrary becau[illegible] standards have been established, though [illegible] closely to the grouping adopted [illegible] "Very good" means that all te[illegible] free from untreated disease; [illegible]

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* Read at a meeting of the Middlesex County Medical Society on April 20.

TABLE III—SICKNESS RECORD OF NURSES OVER 2 YEARS

Analysed according to: (A) residence or non-residence; and (B) grade of nurse

—	1941				1942			
	Nurses	Total sickness (days)	Av. sickness per head (days)	No sickness (%)	Nurses	Total sickness (days)	Av. sickness per head (days)	No sickness (%)
(A)								
Resident ..	30	1704	7·6	..	111	3259	12·4	..
Non-resident	98		15	..	117		15 9	..
(B)								
Trained ..	50	..	5 2	44	60	..	6·9	12
Student ..	0	..	..	..	56	..	11·6	37
Assistant ..	52	..	22·8	8	54	..	17·7	13
Auxiliary ..	26	..	9·8	23	58	..	16	22

to 4 teeth missing, treated caries in several and early caries in 1 or 2; "poor" implies a dental state worse than this with many posterior teeth missing, caries in more than 3 teeth, the whole often associated with gingivitis. The higher percentage of very good teeth in the younger age-groups suggests that the better dental attention of recent years is bearing some fruit. The proportion of poor teeth, especially among the auxiliaries, shows that there is still much to be done, and the number of nurses with back teeth missing who were without dentures was particularly striking.

The figures for varicose veins do not suggest that nursing predisposes to their development. The incidence of foot defects is probably too low and needs correction by figures obtained for a similar group examined by a specialist. The acne vulgaris was mild in all but 2 cases, but it is an unpleasant condition and might well be taken more seriously. In one hospital in South Africa no nurse with acne is allowed to work in a surgical ward (Hugo 1939).

The degree of emotional stability cannot be fairly judged at the first examination. Yet such judgment is important and often neglected. The need for a period of careful observation may be evident at the first meeting, and it is significant that of the cases noted under this heading all except one subsequently left.

The main difficulty of such examinations is in recognising early defects. In this respect one's previous training is inadequate, providing a conception of medicine overshadowed by established and often irreversible disease. It is hardly less difficult to decide on what grounds a girl should be rejected altogether. To certify that a person is free from any physical and mental defect which may lead to retirement before the prescribed age is a responsible undertaking. Accurate guidance in this field can only be reached by wide surveys for a sufficiently long period. and so far no such data are available.

TABLE IV—DURATION OF SICKNESS IN EACH GRADE

Grade	No in group	Percentage of nurses sick for various periods (days)							
		1	2	3–7	8–14	15–21	22–28	29–84	84 +
Trained ..	58	25	20	20	10	10	10	2·5	2 5
Student ..	63	3	15	24	10	14	6	28	..
Assistant ..	87	18	10	27	13	7	5	17	3
Auxiliary ..	78	11	8	24	18	11	6	17	5

DETAILS OF SICKNESS

The main points to note (table III) are a greater incidence of sickness among students than trained staff and an even greater incidence among the assistants. With small groups one or two long illnesses might account for these differences, but the distribution of sickness for different lengths of time (table IV) confirms the reality of the differences. Even allowing for one very long illness among the assistant nurses in 1942, their level of sickness in both years is much higher than that of the first two groups. The auxiliaries show a difference in the two years, though the size and inequality in numbers make it unwise to draw any definite conclusions. In the second year their sickness level more closely resembles that of the assistants than of the first two groups. The difference between resident and non-resident groups in 1941 was not maintained in 1942 when the groups were numerically more comparable. The American survey gave a similar sickness-rate for trained staff, but lower figures for the students, ranging from 5·9 to 10·6 days. If the American figures (table V) apply to this country, and they probably do, nursing would seem to entail a greater risk of disease than other professions, though the sickness "threshold" must vary widely. Also when occupational risk is not great and supervision good, as in the "large store," the sickness-rate reaches a very low figure. In nursing it is clearly a question of greater occupational risk against better health supervision. though the latter unfortunately is still only potential in many hospitals, and where health supervision is good nurses are more readily kept away from the wards.

TABLE V—SICKNESS RECORDS IN PRESENT SURVEY COMPARED WITH RECORDS OF AMERICAN NURSES AND OTHER GROUPS

Group	No. of persons	Date	Age (yr.)	Av. annual sickness per person (days)
Nurses				
Present survey—				
Trained	60	1942	21–45	6·9
Student	56	1942	17–30	11·6
American survey (trained)	8794	1937–38	21–35	6·6
	17,364	1937–38	18–25	8·3
Other occupations				
English insured population, 1933*	16,000,000	1933	..	11·2
Staff of large store* ..	1000	5 years	..	4·4
America—				
College students ..	1258	1925–26	17–20	1·8
Teachers	3240	1934–35	20–60	3·5
Domestic servants ..	..	1932	..	10·8

* Cited from Vernon (1939).

Turning to the causes of sickness (table VI), we find as expected *respiratory infections* (colds, nasal sinusitis, tonsillitis, bronchitis and influenza) easily first both in days lost and number of staff involved. But this is more than an administrative problem; it may be a source of inconvenience and danger to the patient. The following incidents in the current life of the hospital illustrate this fact.

A house-surgeon with a mild cold assisted in the operating-theatre; β hæmolytic streptococci were later isolated from his nose and he was sent off duty. One of the patients operated on developed scarlet fever and another streptococcal peritonitis from which she subsequently died.

A nurse on duty in a small isolation unit developed a sharp upper respiratory infection. After 2 days she went off duty and was away for 3 weeks. Seven patients who were expecting to leave the hospital within the next few days developed a similar clinical picture 48 hours later, which added 10 days to each one's stay in hospital.

In this group of disorders it is not too much to say that familiarity has bred inertia. Serious preventive measures on a large scale have not been taken, though if these figures are true for most hospitals the need is real and urgent.

Skin diseases include boils, impetigo and scabies in that order.

In this section a reference to erythema nodosum is required; 1941 provided 1 case forming part of a primary tuberculous complex. In 1942 there were 4 cases. Only 1 of these was associated unmistakably with primary tuberculosis, though the clinical course in 2 others was essentially similar. The last had a negative Mantoux reaction and was associated with a streptococcal infection of the hand. It is difficult to escape the conclusion that the opening of two wards for tuberculous patients in December, 1941, was related to the increased incidence, especially as 3 of the nurses developed the erythema at the end of 3 months' duty on these wards. Unfortunately, routine Mantoux testing, though intended from the start had not been carried out and the initial reaction of these nurses is unknown. Although erythema nodosum has several causes, its main value lies in drawing attention to a possible primary tuberculous infection at a very early stage.

The *accidents* were minor ones except for 2 cases of fracture. In the main they were not sustained while on duty, though the black-out, both inside and outside the

xclusively in the certi-
panel doctors.
or 32 single days and
seemed to cover a multitude of sins.

The causes of sickness in each group are shown in table VII. The better health of the trained staff is evident on almost every count except respiratory infections where they gave rather higher figures than the students. These were mainly colds, and the nurse or sister was away for only a short period. There is probably a tendency among this group, owing to their greater responsibilities, to ignore illness which they consider trifling and to stay on duty when they should really be at home. The poorer health of the assistants and auxiliaries is well shown. Analysis of seasonal variations showed the expected rise during the winter months almost entirely due to respiratory infections. No local figures were obtained to show the variation with age, marriage, night duty or service in different departments of the hospital.

much higher incidence of
children's wards and the

of this survey of sickness in a sector hospital concerns the group variation. Only tentative explanations are permissible. The trained staff are seasoned troops and have the most satisfactory economic position. The students are susceptible young adults, many of them entering resident life for the first time, and all of them making their first contact with concentrated disease. Branson (1933) suggests that the first year may be as prolific in illness as the three subsequent years together.

TABLE VI—DISTRIBUTION OF SICKNESS IN PRESENT SURVEY

Disease	Days lost		Staff ill (%)	
	1941	1942	1941	1942
All	1704	3259	..	..
Respiratory infections	637	1163	38	45
Skin disorders	194	231	6	5
Peptic ulcer	140	105	3	0·4
Accidents	101	179	5	6
Debility	98	71	3·7	1·3
Rheumatism	89	43	3·7	1·3
Urinary infections ..	75	63	3·7	1·5
Septic fingers	71	210	5	8
Primary tubercle	64	206	0·8	0·9
Neurosis	63	50	0·8	0·9
Gastro-enteritis	57	285	3	9
Other disorders	130	250	27·3	20·4

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contact with concentrated disease is also a factor. Finally, for many it is a war-time job, and in this connexion the observation of Millais Culpin (1930), that where 40% or less of the workers are satisfied with their work the sickness-rates are high, is of interest.

With regard to the Mantoux test (table VIII), the proportion of negative reactors is low compared with other surveys. This is accounted for, at least in part, by the fact that the majority had been in hospital for some time before testing was carried out. A nurses' training school has now been established in the hospital and the figures for new students in the coming years will be of greater value.

TABLE VII—PERCENTAGE ILL IN EACH STAFF GROUP, 1942

Disease	Trained	Student	Assistant	Auxiliary
Respiratory infections ..	30	23	68	57
Gastro-enteritis	3	13	9	15
Skin disorders	1·6	9	10	1·6
Septic fingers	1·6	7	13	9
Accidents	6	9	4	3·5
Peptic ulcers	1·6	..	..	..
Debility	1·6	..	4	..
Urinary infections ..	3	..	3·7	..
Neurosis	..	..	1·8	1·7
Rheumatism	..		5	..
Tuberculosis—				
Primary	..	1·8	..	..
Bronchogenic	1·6	..	..	..
Bilious	10	1·8	20	3

Routine hæmoglobin estimations, though considered desirable, were not carried out for war-time reasons. The level below which anæmia can be said to exist has not been drawn with certainty. If we take the current *figure of 80% hæmoglobin as the dividing line, in the* small sample of 52 nurses taken for blood-donation purposes only 2% were below this level.

Hb. % ..	70–75	75–80	80–85	85–90	90–95
Nurses ..	1	0	4	10	9
Hb % ..	95–100	100–105	105–110	110–115	115–120
Nurses ..	11	7	8	0	2

Attention has recently been focused on this subject by Lucy Wills and her co-workers (1942). They appear to show that nurses in sector hospitals have lower hæmoglobin levels (84·1%) than those working in London (90·6%). This was associated with an inadequate dietary—the inadequacy being not only in iron but also in total calories and proteins. A recent critical review of this work suggests that "these women were not getting as satisfactory a diet as it is possible to get in war-time Britain, and there is evidence that these conditions are not confined to one particular sector" (*Brit. med. J.* 1943, i, 440). It is clear that routine hæmoglobin estimations on large numbers of nurses are desirable, followed by investigation of the dietetic and other relevant factors if an appreciable incidence of anæmia is found.

TABLE VIII—RESULTS OF MANTOUX AND SCHICK TESTING

Test	Nurses tested	Positive		Negative	
		No	%	No	%
Mantoux 1:10,000→1:100	196	185	94·4	11	5·6
Schick	202	104	51	98	49
Trained	50	19	38	31	62
Student	92	53	56	39	44
Assistant .. .. Auxiliary	60	32	53	28	47
Age (yr) 15–20	19	13	68	6	32
20–30	130	73	56	57	44
30+	53	18	34	35	66

CONCLUSIONS AND SUGGESTIONS

The health of a group is the resultant of all the constitutional and environmental factors involved. The health of nurses is probably less satisfactory than that of women in other professions. To establish this requires a detailed survey of large numbers over several years. Such essential data, which must include details of accommodation, dietary and recreational facilities, are not at present available for this country. In view of the greater occupational risks entailed by a nursing career, all possible measures must be taken by hospitals to promote the highest level of health. These should include ample accommodation, a liberal diet, adequate facilities for mental and physical recreation, and preventive leave of absence where impending breakdown is suspected.

Respiratory infections are the greatest single cause of ill health in the group. A serious experimental study of practical preventive measures is urgently needed and the resulting recommendations, however irksome, should be endorsed. Developments along this line in American sanatoria may prove a helpful guide to the kind of action required.

To carry these principles into effect, a comprehensive health programme should exist in all hospitals. From the experience of this hospital, the most satisfactory body to direct this is a team consisting of the senior medical administrator, the matron and the senior physician and surgeon—to which could profitably be added a nurses' representative and a health supervisor and keeper of records. The essentials of such a scheme are:

1. A detailed initial examination including routine Mantoux and Schick testing, hæmoglobin estimations and X-ray examination of chest. These should be followed by immunisation where necessary.
2. Re-examination at regular intervals—the average period being 12 months, with shorter intervals in special cases. In many cases, if not in all, a probationary period of 3 months before acceptance is desirable.
3. Adequate facilities for treatment of all sickness within the hospital.
4. A frank explanation of the nature and purpose of these health measures to the nurse on admission and as occasion demands.
5. A uniform record card for the whole region suitable for statistical purposes.

This health programme to be fully effective should include all hospital personnel.

My thanks are due to the medical director, the matron and the senior pathologist for their help.

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PRESSURE PALSY IN THE PARALYSED LIMB *

WALPOLE LEWIN, M S LOND, F R C S
LIEUTENANT RAMC

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FOR a long time surgeons have known that the lateral popliteal nerve is vulnerable as it winds around the neck of the fibula to gain the anterior aspect of the leg, and that it may be damaged by local pressure even when this is maintained for relatively short periods. In surgical practice, these pressure palsies, resulting in foot-drop and anæsthesia over the dorsum of the foot and sometimes over the outer aspect of the leg, have been seen after the application of a badly moulded plaster or plaster bed, or after manual pressure on the plaster, while it is still soft, during the manipulation of a fractured leg. Tight bandaging around the knee after operations on that joint, the slipping of a badly applied wooden back splint, or unrelieved pressure of the leg against the outer bar of a Thomas splint are other well-known causes. Instances such as these are far commoner than is usually supposed, and partial lesions of the nerve will often be found if carefully looked for.

Seeing how easily the complication may happen in the otherwise normal limb, it is clear that it would the more readily follow application of splints and plaster to the paralysed limb of hemiplegia or paraplegia, and such is found to be the case. There are, however, some additional factors to consider. If the flaccid limb is allowed to adopt its natural position, it lies everted with the outer side of the knee resting on the bed; in narrow beds and stretchers this usually means the hard edge, and if the limb is allowed to remain for a time in this position, a pressure palsy of the nerve may result. It must also be remembered that the paralysed limb wastes, thereby rendering the nerve more susceptible to external pressure.

CASE 1.—A private, aged 36, was injured in Libya on Nov. 29, 1941. While sheltering under his truck from a dive-bombing attack, he was struck in the back by the axle of another truck. He sustained a severe crush fracture of L.1 with immediate onset of flaccid paralysis of both legs and retention of urine. In mid-January, 1942, plaster back splints were applied to both legs and were extended up to the knees. Within a week a plaster sore had developed over the head of the left fibula. A little later a similar one appeared on the right side and they both became progressively worse.

He was admitted to a military hospital on Oct. 1, 1942, with a large ulcer on each side which had exposed the head of the fibula. These healed slowly leaving depressed scars; from their position the lateral popliteal nerves must have been involved and were buried in dense scar tissue. For the eight months during which he was under observation there was gradual improvement in the thigh muscles but no vestige of returning function below the knees.

DIAGNOSIS

Before giving further details of this case, it will be convenient to describe the methods of investigation employed in these cases. To demonstrate the existence of a peripheral nerve lesion in a limb already paralysed by a more central lesion, a combination of three methods has been found applicable: clinical examination, electromyography and the sweating reaction.

Clinical examination.—The presence of a sensory loss over the limb corresponding to the distribution of the nerve or its branches, or the detection of flaccidity in the peroneal and anterior tibial muscle groups in association with spasticity of the surrounding muscles, is, of course, diagnostic. In the main, however, the examination can only suggest the possibility of a peripheral nerve palsy. The lesion may be suspected in the presence of one of the following signs: continued absence of power in the peroneal and anterior tibial muscle groups of a limb otherwise recovering; a disproportionate rate of wasting of these muscles in the paralysed limb; failure of these muscles to participate in the mass reflex in a case of paraplegia; failure to elicit this reflex by stimulating the dorsum of the foot or outer side of the leg. The presence of a plaster sore or bed-sore over the head of the fibula, as in the case described above, is always highly suggestive. Nevertheless it is usually impossible to dogmatise on the clinical examination alone, and the proof lies in the results of the sweating reaction and electromyogram.

Electromyography.—The recent investigations of Weddell, Feinstein and Pattle[2] into the electrical activity of voluntary muscles and the changes produced by denervation have immediate clinical application. The presence of fibrillation action potentials is evidence of a lower motor neurone denervation of the muscle concerned; it does not occur in an upper motor neurone lesion. Consequently electromyography in the group of cases now under consideration has proved of the utmost value in establishing the existence of these lateral popliteal palsies.

Sweating reaction.—Guttmann[3] has demonstrated the sweating disturbances which occur in hemiplegia, paraplegia and peripheral nerve lesions. With the quinizarin method, a peripheral nerve lesion is shown by the absence of sweating over the distribution of the nerve. In these particular cases, the sweating disturbance is seen in marked contrast to the central reaction elsewhere. In cauda equina lesions the test becomes diagnostic, for where such a lesion is complete, neither neurological examination nor electromyography will determine the actual level of the injury. The sweating test, however, will immediately differentiate a spinal from a peripheral lesion since at the cauda equina level there are no sympathetic fibres; these having left the cord higher up are now distributed with the peripheral nerves. Consequently, the picture in a cauda equina lesion is that of normal or even increased sweating of the limb, and a superimposed peripheral lesion with a resultant area of anhydrosis is readily seen.

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* A paper read to the Society of British Neurological Surgeons in [illegible] 1943.

[2] Weddell, G., Feinstein, B. and Pattle, R. E. *Lancet*, 1943, i, 236.

[3] Guttmann, L. *Z. ges. Neurol. Psychiat.* 1931, 135, 1; *J. Neurol. Psychiat.* 1940, 3, 197; *Proc. R. Soc. Med.* 1941, 35, 77.

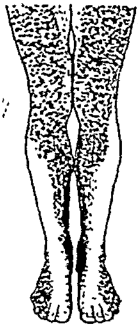


Fig. 1—Case 1. Anhydrosis over the distribution of both popliteal nerves.

CASE-RECORDS

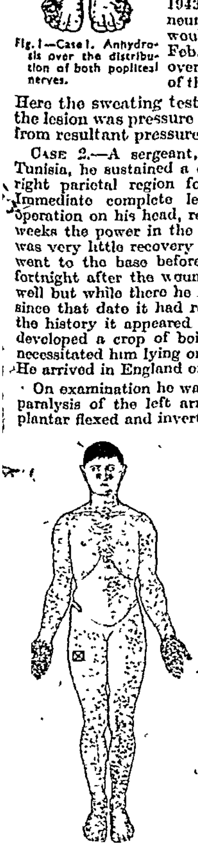
Using these methods together, it has been possible to demonstrate lateral popliteal nerve palsies in some cases of hemiplegia and paraplegia resulting from injury or gunshot wound. A fuller consideration of some of these case-records will bring out these points.

CASE 1 (*continued*).—In this case of a cauda equina lesion, the possibility of a [illegible]

1943, showed a complete lower motor neurone denervation below the knees as would be expected. A sweating test on Feb. 6 showed an area of anhydrosis over the legs limited to the distribution of the lateral popliteal nerves (fig. 1).

Here the sweating test was diagnostic and the cause of the lesion was pressure by plaster back slabs and scarring from resultant pressure sores.

CASE 2.—A sergeant, aged 31. On Nov. 29, 1942, in Tunisia, he sustained a compound depressed fracture of the right parietal region following the explosion of a mine. Immediate complete left hemiplegia resulted. After an operation on his head, recovery began, and for the first few weeks the power in the left leg improved rapidly but there was very little recovery in the arm. He said that when he went to the base before embarkation on Dec. 13, 1942, a fortnight after the wound, he could dorsiflex his left ankle well but while there he noticed it was weak again and that since that date it had remained so. On going further into the history it appeared that, while at the base, the patient developed a crop of boils on the right buttock which had necessitated him lying on his paralysed side for three weeks. He arrived in England on Feb. 7, 1943.



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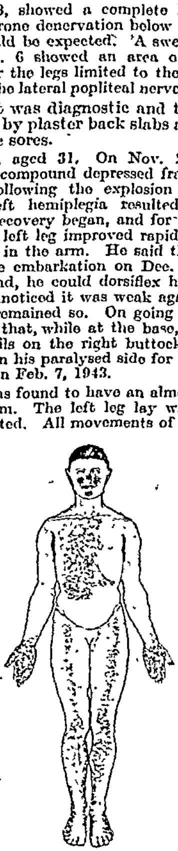

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Fig. 2—Case 2. Increased sweating on left side of body, and an area of anhydrosis over the distribution of the terminal branches of the musculocutaneous nerve of the left leg.

Fig. 3—Case 3. Band of increased sweating at Th.9-10 level, and absence of sweating over the distribution of both lateral popliteal nerves.

On examination he was found to have an almost complete paralysis of the left arm. The left leg lay with the foot plantar flexed and inverted. All movements of the leg were present but dorsiflexion of the foot was relatively weaker than the other movements and there was no actual power of eversion although the peronei could be felt contracting. In addition there was a small but definite area of hypoæsthesia to pinprick and to cotton-wool over the dorsum of the foot in line with the first three toes, but sparing the first interdigital cleft. Vibration sense in the leg was slightly impaired, position sense grossly so, but the distribution of the cutaneous sensory loss strongly suggested a musculocutaneous nerve lesion; the combination of extremely weak peronei with the story of sudden onset of weakness of dorsiflexion of the ankle made a clinical diagnosis of a partial lateral popliteal nerve injury certain.

Electromyography on Feb. 16 showed no actual fibrillation but motor unit irritability was present together with very diminished motor unit action potentials in the peroneal muscles suggesting a transient block to the nerve; a sweating test on Feb. 15 demonstrated the central disturbance over the left side of the body together with a peripheral lesion of the leg corresponding to the musculocutaneous nerve (fig. 2).

Both neurological examination and electromyography suggested that the lesion was incomplete and this was borne out by the steady progress the patient made over the ensuing two months. On March 20 power in both ankles was equal. The little sensory loss still remained.

Here the cause of the lesion was undoubtedly pressure due to posture in bed and the peripheral nerve lesion could be readily demonstrated on clinical examination.

CASE 3.—A boy of 14. On May 3, 1942, he was accidentally shot by a stray bullet when visiting an aerodrome. The bullet entered at the outer aspect of the left shoulder and came out in the right lumbar region. He had an immediate [illegible] X-ray examination [illegible] the arch of Th.10. [illegible] mass reflex could be obtained but it was noticed that there was no contraction of the extensor hallucis longus or tibialis anticus on either side, nor could the reflex be obtained by stimulating the dorsum of the foot although it could be elicited by stroking the outer border. The paraplegia remained complete.

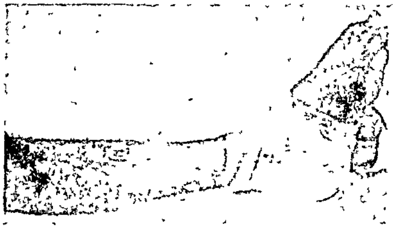

Fig. 4—Case 4. Sweating test: reaction over the outer side of the foot and front of the leg, and absence of sweating over the dorsum of the foot and outer aspect of the leg.

Electromyography on Feb. 3, 1943, showed fibrillation in the peroneal muscles on both sides corresponding to a lower motor neurone denervation. A sweating test on Feb. 9 showed a band of increased sweating at the Th.9-10 level, delayed onset of sweating in the legs and absence of sweating over the distribution of both lateral popliteal nerves (fig. 3).

The cause of the lesion here was presumably posture, no splints having been applied at any time. The only clinical evidence of its existence was the observation on the mass reflex, but electromyography and the sweating test proved its presence.

CASE 4.—A lance-corporal aged 28. This soldier was accidentally shot by one of his own men while in Libya on Dec. 21, 1942. There was immediate paralysis from the waist down and an X-ray of the spine disclosed a bullet lying to the left of Th.9-10 interspace with fracture of the tip of the transverse process of Th.10. Laminectomy was performed and the dura found intact. The bullet was not removed. There was no recovery. On Jan. 14, 1943, wire back splints were applied to the legs, extending up to the knees. A fortnight later a pressure sore developed over the [illegible] it was not clear whether this was [illegible] The sore subsequently healed [illegible] there might be an associated peripheral nerve lesion.

On April 29 the electromyogram showed fibrillation in all the muscles supplied by the lateral popliteal nerve on [illegible] sides and a sweating test on May 4 confirmed the [illegible] lesion (fig. 4).

Here was a complete flaccid paraplegia and the superimposed pressure palsy could only be demonstrated by the sweating test and electromyography.

CASE 5.—A sergeant aged 38 was wounded in a tank on Sept. 1, 1942, in Libya, and received a compound fracture of the left parietal region with resultant right flaccid hemiplegia. For the first three months the paralysis remained complete but then there was a fairly rapid improvement. On admission here, he had good movement in the arm and fair power in the thigh muscles so that he could hobble *a few steps with* the aid of a stick. There was, however, a persistent gross foot-drop. He had some 20° of plantar-flexion but only 5° of dorsiflexion of the ankle and no power at all in the peronei or extensors of the toes, though they could be felt contracting feebly. No definite sensory loss was detectable.

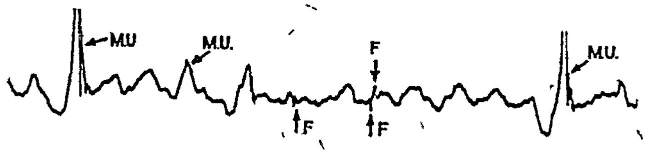

Fig. 5—Case 5. Electromyogram. F = fibrillation action potentials. MU = motor unit action potentials.

A sweating test on March 30, 1943, showed no evidence of a peripheral nerve lesion but the electromyogram on March 29 recorded fibrillation in the peronei and anterior tibial group of muscles together with strong motor unit irritability and some motor unit action potentials (fig. 5).

There was, therefore, in this case a partial lesion of the lateral popliteal nerve due to posture. It was interesting to note the dissociated motor damage in the nerve without sensory involvement. The strong motor unit irritability in the muscles suggested that the lesion here was slight, but although the main cause of the disability was clearly central, the added peripheral nerve damage *will certainly delay recovery.*

DISCUSSION

Pressure palsy of the lateral popliteal nerve has been demonstrated in these 5 cases of limbs already paralysed by a more centrally placed lesion; 3 were due simply to faulty posture of the paralysed limb in bed, 1 followed the application of plaster back splints, and 1 followed prolonged pressure on the nerve enforced by lying on the paralysed side because of a coincident infection in the other leg. It is not without significance that 4 out of the 5 cases came from overseas and underwent considerable transport with frequent changes of medical and nursing attendance. The fact that they have been seen in patients admitted to this hospital over a period of three months would imply that this complication is commoner than usually supposed. Within this period I have also seen a complete lateral popliteal palsy consequent on bandaging the knee after operation for a fractured patella and a partial palsy following a plaster cast applied for a fractured fibula.

The object of presenting these cases is to prove the existence of these pressure palsies in limbs already paralysed by a more central lesion, and to suggest that this incidence can be reduced by the adoption of simple prophylactic measures. Whatever kind of splintage is used on a leg, it must be carefully applied and immediate adjustment made should it slip. If a leg is put in plaster, the limb should be tested at regular intervals during the first few days after application, by the doctor or a trained nurse, to ensure that the patient can still dorsiflex his toes easily and that there is no blunting of sensation to pinprick over the dorsum of the foot as far as it is exposed. In the paralysed limb, avoidance of prolonged pressure on the lateral popliteal nerve becomes another important point in the careful nursing which all these cases demand; the limb must not be allowed to rest near the edge of the bed and it should be supported by a soft pillow under the knee. Careful attention must be given to the head of the fibula as a likely pressure point. In the Services, where these patients often have to be transported long distances in splints of various kinds and on hard narrow beds or stretchers, it is particularly important that the doctors and nurses in charge of them should be fully alive to the danger. Nursing, unfortunately, must often be rough and ready under these conditions and then it is the wisest policy, where applicable, to bandage on lightly a large pad of cotton-wool over the outer side of the knee.

SUMMARY

Attention has been drawn to the relative commonness in paralysed limbs of lateral popliteal palsies, due to pressure.

Five cases are recorded.

Clinically it is often impossible to differentiate these *palsies, but electromyography and the sweating test* clearly demonstrate them. It is stressed that all who have the nursing care of such patients, particularly in their transport, should be fully aware of the condition and prevent it by adopting simple prophylactic measures.

In many of these cases, where progress is often to be measured by so little, we must take especial care that in their treatment we do not unwittingly add to their disability.

I wish to thank Dr. L. Guttmann and Captain G. Weddell, RAMC, who were responsible for the sweating tests and electromyograms respectively; Brigadier Hugh Cairns for his advice and encouragement in the preparation of this paper; and Lieut.-Col. G. O. Chambers, RAMC, my commanding officer, for permission to publish these cases.

AN OUTBREAK OF GASTRO-ENTERITIS IN THE NEWBORN*

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OF late years both in this country and in America, there have been a number of obscure outbreaks of gastro-enteritis among newborn infants in maternity hospitals. The case-mortality rates have sometimes been as high as 80–90 %, and the results of treatment very disappointing. The need for further knowledge demands publicity for the findings in any such outbreak, and I accordingly report recent events in the maternity department of the Central Middlesex County Hospital.

The maternity block, quite separate from the general hospital, consists of two floors working independently, each floor having its own labour ward and accommodation for nearly 30 mothers and children. On each floor mothers are put either in single rooms or in small wards which seldom contain more than 4 patients; but the children on each floor are kept in one large nursery, to which is attached a large bathroom and changing-room. On the upper floor there is also a smaller nursery for premature infants and others that are weakly. All children are as far as possible breast-fed, but where complementary feeds are necessary they were prepared by a staff nurse in the general kitchen on each floor; between preparation and use they were kept covered in a cold larder. The nurses who fed the babies also had to do the changing, which took place on a special table in the bathing-room continuous with the main nursery, and these nurses also had to attend some of the mothers.

On Nov. 1, 1942, 2 out of 6 children in the prematures' nursery appeared to have gastro-enteritis and were immediately transferred to the general children's ward of the hospital. There were at that time in the upstairs nursery 24 children, and it happened that an exceptionally large proportion were receiving bottle feeds, only 12 of the total of 30 being *fully* fed at the breast. The remainder were having either complementary feeds in addition to breast feeds or were having bottle feeds of breast milk.

On Nov. 3 2 more children in the prematures' nursery developed gastro-enteritis and were transferred to the hospital children's ward. On the same day and the next day the condition of several children in the main nursery seemed unsatisfactory; so no further new cases were admitted to either nursery.

On Nov. 6 one of the children in the main nursery, who had had rather loose stools, suddenly died. A careful and critical survey was undertaken of all the children on the upper floor and the following steps were taken:

1. The upper floor was closed to all further admissions. It was not to be reopened until thoroughly cleaned.

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* Based on a paper read to the Middlesex County Medical Society.

2. The children were divided into two lots. (*a*) The 12 children who appeared to be well were transferred to a 4-bedded mothers' ward which was converted into an observation nursery. (*b*) The remaining 7, who appeared to have gastro-enteritis were kept isolated in the main nursery.

3. The nursing arrangements in the two nurseries were amplified and kept strictly separate.

Between Nov. 1 and Nov. 6, when the outbreak became obvious, 7 children had been discharged, 6 of these being fully breast-fed. The 7 who appeared ill on Nov. 6 all steadily became worse and died. Of the 12 removed to the observation nursery, 6, who were entirely breast-fed, did not develop any symptoms and were eventually discharged. The other 6 all developed gastro-enteritis within three days, and 3 of them died. The 4 infants transferred from the prematures' nursery to the children's ward also died. We therefore find that of a possible 31 children 18 became ill and 15 died, giving a case-mortality rate of 83%.

COURSE OF ILLNESS

The clinical course generally fitted the description of the serious cases given by Ormiston (1941). The average age at onset—excluding the children in the prematures' nursery—was 13 days. Some had been kept in the maternity nursery because they were not making satisfactory progress and were unable to feed from their own mothers.

As a rule the onset was sudden; but it was insidious in the 3 cases which recovered. The first symptom was usually unexplained vomiting, but in 6 cases it was a sudden loss in weight (up to 8 oz.) in children otherwise apparently well. In only 2 cases did the illness start with diarrhœa, but in all of them this soon became the worst symptom. Th[illegible] to 7 per day, [illegible] (This orange [illegible] The loss of [illegible] and death was often rather sudden. Many of the children showed much abdominal distension, and in 3 cases the vomit became blood-stained before death. The temperature was usually either normal or raised to about 100° F.; in only one case did it reach 104° F., and this child recovered. Jaundice developed in 2, and sclerema in 4.

TREATMENT

For the first 12–24 hours nothing was given by mouth except half-strength physiological saline with 5% glucose. Dehydration was treated with subcutaneous salines, or in some cases with intravenous infusion of fluids by the drip method. Usually the infusion started with 500–1000 c.cm. of 5% dextrose in physiological saline, followed by 5% dextrose in plain water, or saline (one-fifth strength) with 4% dextrose, until dehydration was overcome.

Feeds, when recommenced, consisted if possible of expressed breast-milk, at first in dilution, or 'Trufood' usually following a short course of 'Seeway.' Where vomiting persisted after the first 24 hours, gastric lavage was performed twice daily till it ceased. Rectal lavage was not employed. Sulphapyridine was tried in a few cases but without any obvious effect. Where sclerema developed local heat was applied by means of an electric blanket; the limbs were massaged frequently, and an extract of adrenal cortex ('Eucortone' 0·5–1·0 c.cm.) was given intramuscularly twice a day. Most of the children were given ascorbic acid 25 mg. daily.

PATHOLOGY

Of the 15 children who died 13 had fairly full autopsies.

The *intestines* showed very little change; in a few cases they were dilated, but no congestion or ulceration was found. The mesenteric glands were not unduly enlarged.

The *liver* showed some abnormality in every case. In 10 it was congested; in 6 there were fatty changes; and in 3 it was jaundiced. The fatty cases showed peripheral degeneration of the liver cells with replacement by fat. In some there was early proliferation of bile canaliculi as seen in adult cirrhosis. These changes were most conspicuous in the jaundiced livers. Such a picture of fatty liver may be found in children in any wasting or infective conditions.

The *thymus* in every case was smaller than normal. Some weighed as little as 1·5 grammes and the average was only 2–3 g. compared with a normal average of about 13 g. The thymus usually grows until puberty (when it may reach 28 g.) after which, by physiological involution the thymic tissue is gradually replaced by fatty tissue. However, in many diseases of childhood, mostly infective but not necessarily so, a so-called accidental involution takes place. Here the lymphocytes seem to disappear, while the reticulum cells swell and contain much fat and hæmosiderin. In most of our cases such involution was found.

The *suprarenals* were in all cases below normal size (average weight 1·5–2·5 g. instead of normal 3 g.). The histological changes were such as ordinarily occur when the child grows older.

The *spleen* in all but 2 cases was larger than normal and congested. It was not a septic spleen and was not soft; on section it showed congestion and much siderosis of the reticulo-endothelial elements—a change characteristic of all wasting diseases. The *lungs* in 1 case showed an early bronchopneumonia and in 2 others a mild tracheitis; in 4 others there was slight emphysema. The *ears* were examined in 8 of the 13 cases and in 3 of these a drop or two of slightly mucopurulent fluid found inside one middle ear; in *no* case was there any otitis media in the ordinary sense of the word. The *heart* showed a congenital abnormality in 2 cases.

These findings did not indicate an acute intestinal infection—or even a septicæmia— but probably a toxic condition which caused wasting of the thymus and suprarenals and degeneration in the liver.

BACTERIOLOGY

Dr. E. F. Gale, of Cambridge, accepted an invitation to include this outbreak in an investigation he was undertaking. The combined results of his work and that of our own laboratory were not very conclusive.

In similar epidemics Dr. Gale had found an abnormally large number of hæmolytic fæcal streptococci in the fæces of affected infants. In our cases the stools showed the streptococcal distribution found in normal stools, and none of them yielded pathogens of the dysentery or food-poisoning group; but in 9 of the 18 cases, either from the stools or post-mortem specimens, or from both, *Pseudomonas pyocyanea* was isolated. This organism is often regarded as a harmless secondary invader, but it has pathogenic properties (Epstein and Grossman 1933). It has been known to invade the gastro-intestinal tract and cases of infantile diarrhœa have been attributed to it. On the other hand Fraenkel (1917) states that its rôle in many intestinal disorders with dysenteric manifestations is insufficiently established. It is known to be a common secondary invader during recovery from diarrhœa and it is often present in normal adult fæces. It could not be isolated from the stools of 20 normal newborn infants from our maternity block. The conclusion was therefore reached that, although the presence of the pseudomonas in a large number of our enteritis cases was unusual, the evidence was insufficient to show that this organism was the primary cause of the infection.

ILLNESSES BEFORE AND AFTER THE OUTBREAK

Examination of the records of infants who were in the maternity block during the four weeks before the outbreak did not reveal any case of diarrhœa and vomiting. Several children had had occasional vomits, or occasional green and loose stools; but apart from possible delay in its progress, no child had become ill and none had been transferred to the hospital children's ward. Symptoms of this kind, together with slight loss in weight, are commonly caused by feeding difficulties. It may be, however, that they were due to one baby after another contracting the disease in very mild form, until there was a flare-up of serious cases (compare Ormiston 1941).

Of the 13 children who had been contacts of the children that developed [illegible] charged apparently well, [illegible] have remained well: one [illegible] one could not be traced. [illegible] a case of gastro-enteritis [illegible] on the ground floor of the maternity block. The infant had been segregated because he had an abscess on the chin and a mild furunculosis. He started having loose stools on Nov. 13, his condition gave rise to anxiety on Nov. 17, when he had rather a big drop in weight, and he died suddenly two days later. Examination of the stools showed no pathogenic organisms and the post-mortem findings were similar to those already described. There was no contact between this child and the upstairs nurseries.

From then onwards there were no further cases of diarrhœa or vomiting in the maternity block; but the hospital children's ward admitted 6 children with severe gastro-enteritis who were born in the maternity department, on the lower floor, between the time of the epidemic and three weeks later. Of these, 2 recovered and 4 died. In 2 of the fatal cases *P. pyocyanea* was repeatedly found in the stool, but the serum of neither child agglutinated an autogenous strain of the organism.

It has not been possible to trace any contact between these infants and those described above, but the cases are mentioned for the sake of completeness. If they are included in the series they make the total number of affected children 25 and the number of deaths 20 (80%).

DISCUSSION

The results of treatment were very disappointing. Possible reasons are:—

1. We were dealing with newborn and premature children whose resistance was possibly at its minimum.
2. The infection, judging by the severity of the cases and the rapid spread, was virulent.
3. Ordinary methods of treating gastro-enteritis were unsuitable.

Sound treatment largely depends on knowing the cause of the illness; but the cause of this type of neonatal diarrhœa remains a mystery. Crowley, Downie, Fulton and Wilson (1941), examining the possibilities, concluded that it is either a virus invading the intestine, or else a systemic infection, intoxication or general metabolic disturbance leading to the proliferation of any pathogenic or potentially pathogenic organism that happens to be in the bowel. The fact that in our cases the intestines showed few pathological changes suggests that the condition was not primarily due to infection of the alimentary tract by a pathogenic organism, while the changes in the liver, thymus and suprarenals all point to a severe constitutional disturbance, probably of toxic origin. One striking fact stands out—namely, that all the breast-fed children remained well whereas all the children receiving bottle feeds of whatever kind became ill. This suggests an infection spread via the feeding-bottle, and its accessories.

As the cause is unknown, treatment of the established cases can only be symptomatic, perhaps including prevention of complications. A major problem is to overcome the initial dehydration; but this is not in itself sufficient. Although adequate hydration nearly always stops the vomiting, the diarrhœa usually persists, and the toxic process seems to continue as shown by the steady downhill progress and damage to the liver and other organs. It therefore seems that treatment should include an attempt to maintain a normal liver function; mere administration of glucose is not enough. The use of vitamin-B complex is justified by experimental evidence that sources of this vitamin (crude liver extracts and yeast) and other water-soluble vitamins provide some protection against a variety of hepatic toxins. Vitamin B is also needed for metabolism of the sugar which is given.

There are two ways, however, in which much can be done. The first is to control the outbreak when it has occurred. This can be achieved only by closing down the departments concerned until all its patients have been discharged and thorough cleansing of the nursery has taken place. Attempts to short-circuit this procedure merely prolong the period during which cases will recur.

The second and perhaps more important way is to prevent the outbreak from occurring. We should insist on breast-feeding whenever possible, and to make bottle-feeding safer we should revise the routine of maternity units, where necessary, as follows:

1. There should be a separate kitchen or room for the preparation of bottle feeds with adequate refrigerator storage space.
2. Preparation of the feeds should be the sole responsibility of one person, who should not, at the same time, have any other duties which may bring her into contact with any bly infected patient.
3. There must be scrupulous care in the sterilisation of feeding-bottles. The feeds should be separately prepared under aseptic conditions and should not be stored in bulk.
4. Nurseries should not be overcrowded and should be under the care of a special sister, preferably trained in a children's hospital. The infants should if possible be under the constant supervision of the pædiatrician of the hospital, with the cooperation of the obstetricians, and there should always be a sufficient number of trained nurses who understand exactly what is meant by contamination and whose sole duty is the care of the children.

SUMMARY

In the nursery of a maternity department 18 newborn infants contracted gastro-enteritis and 15 of them died, giving a case-mortality of over 80%. After the outbreak there were 7 more, apparently unconnected cases with 5 deaths.

The outbreak was confined to bottle-fed infants.

Pseudomonas pyocyanea was isolated from the stools or elsewhere in 11 of the 25 cases, but it may have been a secondary invader.

The post-mortem findings suggested an acute toxic condition rather than an intestinal infection. The liver, thymus, and suprarenals were notably affected.

Treatment of this form of gastro-enteritis is at present empirical. The chief aims should be to guard against dehydration and protect the liver.

To prevent such outbreaks, breast-feeding should be encouraged, and in infant nurseries special precautions should be taken to avoid infection through bottle feeds.

I have to thank several of my colleagues for their kind hel especially Dr. W. Pagel and Dr. J. H. Humphrey for th pathological and bacteriological investigations.

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SULPHAPYRIDINE ABSORPTION THROUG THE HUMAN PLEURA

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THE absorption of sulphanilamide and its relate drugs has been investigated by many workers. Here and Brown (1940) found blood levels of sulphanilamid up to 3·0 mg. per 100 c.cm. after thrice daily injection sulphanilamide suspension into infected pleural and peri toneal cavities. Hudson, Smith and Selbie (1941 Hudson and Smith (1942), Hawking and Hunt (1942 Mueller and Thompson (1942) and Jackson and Colle (1942) have all obtained results which are in close agree ment. The main points are that up to 10 g. of sulphani amide placed in the peritoneal cavity has led to bloo levels of about 10 mg. per 100 c.cm. of the drug (occa sionally above 15 mg. per 100 c.cm.), with eliminatio from the blood at the end of four days. Hawking an Hunt also found that sulphadiazine similarly applied le to maximum blood levels of 10 mg. per 100 c.cm. an that excretion was incomplete in 2 cases at autopsy a the end of eight and ten days.

An account is given here of the absorption of sulpha pyridine through the pleura as observed in 22 cases o the Thoracic Surgical Unit at Harefield. The sulpha pyridine was placed in the pleural cavity as a powde at the end of operation, being smeared over the pleur immediately before the operation wound was closed Morning and evening estimations of the amount of th free drug in the blood were then made, by a slightl modified Marshall's method, until the amount presen was less than 0·5 mg. per 100 c.cm., recorded in th accompanying tables as a trace (tr.). No sulphonamide were given by mouth during this time.

BLOOD LEVELS

In table I the sex, age, operation, dose of sulpha pyridine, and the serial blood levels are recorded. The lobectomies were done for bronchiectasis and the pneu monectomies for neoplasm, and the amount of drug inserted was usually 7·5 g., a few cases having 5 g. and

TABLE I—BLOOD LEVELS OF SULPHAPYRIDINE (MG. PER 100 C.CM.) AFTER INTRAPLEURAL INSERTION AT LOBECTOMY (LOB.) OR PNEUMONECTOMY (PNEU.)

Maximum levels are shown in bold figures

Case	Sex	Age (yr.)	Opn.	Dose (g.)	Days: morning specimen (M), evening specimen (E)													
					E	1M	E	2M	E	3M	E	4M	E	5M	E	6M	E	7M
1	M	8	Lob.	5·0	4·5	**5·5**	4·6	4·9	3·5	2·3	1·8	1·1	0·8	0·7	0·6	0·5	..	tr.
2	M	10	"	7·5	2·1	**3·1**	..	2·3	..	0·9	0·8	0·7	0·6	0·6	..	tr.	..	..
3	M	30	"	"	**2·5**	2·5	2·5	2·5	1·4	1·2	0·9	0·8	0·6	tr.	..	..	..	..
4	F	20	"	"	1·3	**1·4**	1·4	1·3	1·0	0·8	0·7	0·7	0·5	tr	..	..	..	..
5	M	20	"	"	2·4	**3·6**	3·6	3·0	1·7	1·1	0·6	tr.	..	..	..	..	..	..
6	M	20	"	"	1·1	1·1	1·1	0·9	0·6	tr	..	..	..	..	..	..	..	..
7	M	22	"	"	1·0	**1·7**	1·5	1·1	0·9	1·1	0·9	1·2	0·7	tr.	..	..	..	..
8*	M	20	"	"	1·6	**2·1**	1·6	1·2	0·9	0·9	0·8	tr.	..	..	..	..	..	..
9†	M	30	"	"	1·2	**1·4**	1·0	0·7	tr.	..	..	..	..	..	..	..	..	..
10†	F	28	"	"	1·0	1·0	..	0·8	0·7	0·7	0·6	tr.	..	..	..	..	..	..
11	F	48	Pneu.	5·0	1·9	**3·0**	2·7	2·6	2·0	2·1	..	2·0	1·8	2·1	1·5	..	1·2	1·2‡
12	M	50	"	"	**2·6**	2·6	2·6	2·6	2·4	1·8	1·3	1·2	0·7	0·7	0·8	..	0·8	tr.
13	M	6	"	"	1·1	**1·5**	1·2	1·1	..	1·1	1·1	tr.	..	..	..	..	..	..
14	M	58	"	7·5	1·9	**2·1**	1·5	1·1	..	0·7	0·6	0·6	..	tr.	..	..	..	..
15	F	33	"	"	1·6	**3·4**	3·4	2·3	2·0	1·8	1·4	1·0	0·8	0·7	tr	..	..	..
16	M	57	"	"	2·3	**4·1**	4·1	3·8	3·6	2·9	2·0	2·1	1·9	1·2	0·7	0·7	0·6	tr.
17	M	35	"	"	0·9	**1·6**	1·4	..	..	1·3	0·7	1·0	0·8	0·6	0·6	0·6	tr.	..
18	M	56	"	"	**2·5**	2·1	2·1	1·8	1·8	1·1	1·1	0·8	0·8	..	0·7	tr.	..	..
19	F	28	"	"	2·1	2·2	**2·8**	1·5	1·1	..	1·4	0·6	0·5	0·6	0·8	0·7	tr.	..
20	F	44	"	"	2·3	**3·8**	**3·8**	3·2	3·1	3·3	..	2·0	1·4	1·5	1·0	1·0	0·9	0·6¶
21	F	48	"	"	1·8	2·0	1·9	**2·2**	1·9	1·0	1·1	0·8	0·8	0·7	0·5	tr.	..	..
22	M	56	"	10·0	3·0	4·3	**5·3**	4·8	3·7	..	2·7	2·3	1·7	1·7	..	tr.	..	..

* "Under water" drainage for first 2¼ days. † "Under water" drainage continuously.
‡ 7th day: E 0·8 8th day: M 0·7, E 1·0. 9th day: M 1·2, E 1·0. 10th day: M 0·9, E 0·8. 11th day: M 0·9, E trace (tr.)
¶ 7th day: E tr.

one 10 g. Cases 8, 9 and 10 had "under water" drainage of the chest after operation. It will be seen that the maximum level reached was, with two exceptions, attained within 24 hours of operation (the operations were all done in the morning). One of the exceptions (case 22) had the larger dose of 10 g. The other [illegible] of 7·5 g. The [illegible] in case 1, a [illegible] this was closely [illegible] of 56, whose [illegible] per 100 c.cm. [illegible] was 1·0 mg. per 100 c.cm. in c[illegible] g. with continuous drainage [illegible] this was only slightly lower than the level of 1·1 mg. per 100 c.cm. recorded in case 6, which had the same dose and no drainage.

The time taken to eliminate the drug ranged from three days in case 9 to twelve days in case 11, the former having 7·5 g. of drug and the latter 5 g., with no [illegible] drainage of [illegible] the blood l[illegible] other case [illegible] eliminated [illegible] all cases. [illegible] pyridine, noticeable here, has been remarked on recently [illegible] Dr Wilson (1943) in the case of absorption via the gut. The rate of elimination was fairly constant in each case, although there were a few temporary decreases, and sometimes the blood level of the drug increased for a short while after its initial fall. Four of these temporary rises followed aspiration of the chest, but usually aspiration [illegible] followed by any visible effect on [illegible] never led to any [illegible] could be noticed.

The rather high maximum blood level in case 16 led to the discovery, on questioning the house-surgeon, that, after the routine blood-transfusion at operation, the [illegible] ed. Later his urinary [illegible] low and renal failure was feared, but the condition soon cleared up. Routine urinary output charts were not done and no correlation can be made between high blood levels of sulphapyridine and urinary output in the other cases.

PLEURAL FLUID LEVELS

Table II shows the relation between the amount of [illegible] blood levels are not closely related; in case 15 they have apparently gone in opposite directions! The extremely high figure of 400 mg. per 100 c.cm. in the first specimen in case 20 can only be accounted for by the presence of solid powdered drug in suspension, the maximum solubility of sulphapyridine in serum being 70 mg. per 100 c.cm. at 37° C. and 50 mg. per 100 c.cm. at 25° C. according to Clarke and others (1942). There seems to be some very variable factor concerned in the absorption through the pleura, and in cases 2, 3 and 16, in par[illegible] hindrance to absorp[illegible] ble that there was a [illegible] pleural fluid, so that [illegible] in different portions [illegible] specimens not being [illegible] conclusion, that [illegible] s full amount [illegible] after the time of the first specimen, taken on [illegible] day after insertion of the sulphapyridine, seems [illegible] In any case the amount of drug in the first spe[illegible] very low for one taken on the 4th day, wh[illegible] in the second specimen was the highest [illegible] the 6th day.

In this connexion the findings of [illegible] (1942) are of interest. They pla[illegible] suspension" of sulphadiazine, which is twice as soluble as sulphapyridine (Clarke et al. 1942), into the peritoneal cavity of two cases at operation. At the autopsies eight and ten days later they found the drug "like small cakes . . . surrounded by adhesions and lymph." Also of interest is Glynn's finding (1941) that sulphapyridine, placed in experimental wounds in rabbits as a powder, could still be found in situ seven days later, with fibroblasts growing around the crystals of the drug. These two findings probably explain the irregular absorption found in the present study. The sulphapyridine powder tends to cake very soon after insertion into the pleural cavity, and a coating of fibrin is rapidly laid down. In addition, adhesions form and in a few days there may be considerable interference with the solution of the drug, and with the circulation of the pleural fluid, leading to impaired and irregular absorption into the blood-stream.

TABLE II—SULPHAPYRIDINE CONTENT OF ASPIRATED PLEURAL FLUID WITH CORRESPONDING BLOOD SULPHAPYRIDINE

Case	Day of aspiration	Sulphapyridine (mg /100 c cm)		Case	Day of aspiration	Sulphapyridine (mg./100 c cm)	
		Pleural fluid	Blood			Pleural fluid	Blood
2	7	24·5	tr	15	5	16	0·8
					7	2·6	0
3	8	11	0	16	3	70	3·7
5	3	52	2·5	17	4	26	1·0
6	3	21	0·8	18	4	3·9	1·3
7	3	28	1 0		6	45·5	0·7
	5	28	1·0	11	8	8·0	0·8
12	7	6·4	0·7	20	3	400	3·1
					7	41	0·9

SUMMARY

Up to 10 g. of sulphapyridine powder placed in the pleural cavity at operation has, in 22 cases, barely and infrequently led to therapeutic levels of the drug in the blood. The maximum level reached was 5·5 mg. per 100 c.cm. This compares with maxima of 10 mg. per 100 c.cm. often reached after the intraperitoneal administration of sulphanilamide.

The average time for complete excretion of sulphapyridine has here been found to be six days, while other workers have found that sulphanilamide is completely excreted in four days when placed intraperitoneally.

Absorption of sulphapyridine through the pleura is irregular from case to case, greatly differing amounts of drug being found in both the pleural fluid and the blood at the same times after operation. This is probably due to caking of the powdered drug and the formation of pleural adhesions which interfere with free absorption.

I am indebted to Mr. T. Holmes Sellors and Mr. Vernon C. Thompson, surgeons to the Thoracic Surgical Unit at Harefield, for permission to do the investigations on their patients and for their help and criticism; to the house-surgeons, sisters and nursing staff on the wards concerned for their coöperation; and to Prof. Alexander Fleming for his advice on the final form of this paper.

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Corpuscular Volume.—In Foy and Kondi's article on Ehrlich's Megaloblasts (*Lancet*, Oct. 23, p. 505) the hæmoglobin values are expressed in grammes per 100 c.cm., and not (as incorrectly stated) in percentages. The authors did see a proof.

HEALTH OF THE FACTORY WORKER IN WARTIME

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(Concluded from p. 724)

POISONING BY BENZENE DERIVATIVES

Aniline poisoning became a notifiable disease in February, 1925, and the term is intended to cover poisoning not only by aniline, but by any nitro or amido derivative of benzene and its homologues such as toluene, which enters the body through the skin or otherwise, and alters the hæmoglobin of the blood.

In 1901, Hay and Prosser White, a certifying factory surgeon, carried out experiments which proved that dinitrobenzene was mainly absorbed through the skin; but it was not until 1916 that Prof. Benjamin Moore repeated experiments with TNT and the due importance of the skin as a channel of absorption was realised especially in regard to preventive measures. Subsequently, this knowledge became of special importance in the case of tetra-ethyl lead with its organic radicle "ethyl" and its serious effects on the central nervous system. The precautions taken by completely covering the worker has made the periodic medical examination of all blenders of this product in this country, performed until recently by Dr. H. E. A. Boldero, uninteresting clinically but otherwise highly satisfactory. Fig. 11 shows the distribution of the 832 cases of aniline poisoning since notification came into force, the mortality-rate being less than 0·5%. While other nitro and amido or amino derivatives have each contributed to a minor extent, the main causal agents have been aniline itself and since the war trinitrotoluol.

The increase in the number of cases during this war is significant, in fact, 529 (or approximately 63·5%) of all the cases have arisen between 1939 and 1942. Of these just over 83% have been due to TNT, 20 in makers as compared with 420 among the much larger number of those who fill shells and bombs. The 5 cases in the year before the war were all in makers of this explosive.

Though the number at risk is not available there is little doubt that it is substantially greater than in the last war. The cases of aniline poisoning notified in peace-time are but samples of several others in which the ashen grey coloration of the lips and tips of ears is present without the worker being aware that anything is wrong; but in war-time the vast majority of workers in contact with TNT are in Royal Ordnance Factories under continuous medical supervision, and in such factories there is an arrangement whereby every case of TNT cyanosis, however slight, is notified. The figures therefore represent a maximum rather than a minimum, and the mild nature of the cases is reflected in the absence of

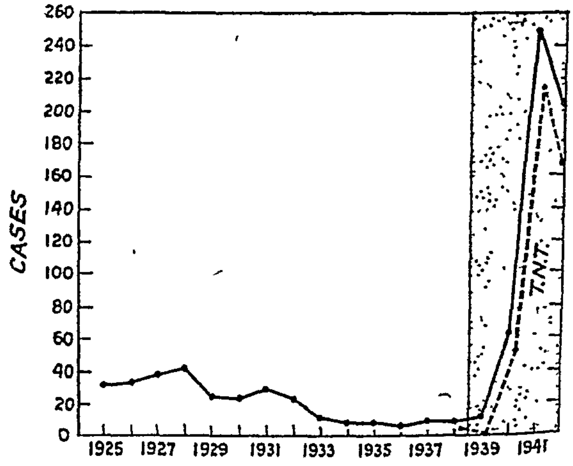

Fig. 11—Aniline poisoning, due to: nitrobenzene ($C_6H_5.NO_2$); dinitr benzene ($C_6H_4.(NO_2)_2$); nitrochlorbenzene ($C_6H_4.NO_2Cl$); dinitr chlorbenzene ($C_6H_3.(NO_2)_2.Cl$); aminobenzene, or aniline ($C_6H_5.NH_2$) nitro-aminobenzene, or nitraniline ($C_6H_4.NH_2.NO_2$); chloraminobenzer or chloraniline ($C_6H_4.NH_2.Cl$): trinitromethylbenzene, or TNT ($C_6H_2.CH$ $(NO_2)_3$); aminomethylbenzene, or aminotoluene, or toluidine ($C_6H_4.CH$ NH_2); chloraminomethylbenzene, or chlortoluidine ($C_6H_3.CH_3.NH_2Cl$)

any fatality during the war I suspect that the other notifiable diseases must resent the intrusion of this member into their select society, but perhaps he has a trump card up his sleeve to play later

Toxic jaundice, which is officially described as "jaundice due to tetrachlorethane or nitro or amido derivatives of benzene or *other* poisonous substance," became a notifiable industrial disease on Jan 1, 1916 (fig 12) Since then 595 cases, of which over 25 7% were fatal have been reported Previously the nomenclature of any disease made notifiable had reference to the causal agent as, for instance, lead or phosphorus, but on this *occasion a new departure was made by choosing a sign* or symptom which might be caused by substances widely differing from each other in composition It was known that, in addition to arseniuretted hydrogen, the earliest cases of toxic jaundice before the last war were attributed to dinitrobenzene Tetrachlorethane used in the doping of aeroplane wings had caused at least 70 cases of jaundice with 12 fatalities between 1914 and 1916, but its use for this purpose ceased after 1916, and for many other purposes since that date, under persuasion and so it is not surprising that no ill effects attributable to this product have arisen during this war

Notification of toxic jaundice left the door open for other causal agents to be brought to light, and so paranitrochlorbenzene was held responsible for one case in 1920, dinitrobenzene for one in 1923, and trichlorethylene for one very doubtful case in 1932 This case was included with much misgiving, as it was felt that some tetrachlorethane might have been present, in error, in previous batches of the solvent liquid, but as careful inquiry failed to prove this suspicion, it was decided to place the case on record, leaving time to show whether one swallow makes a summer

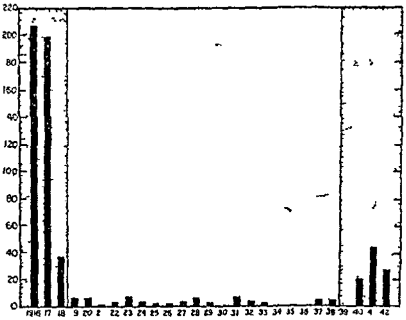

Fig 12—Cases of toxic jaundice notified since 1916 Caused by TNT 501 with 130 deaths (25 9%) tetrachlorethane 29 with 6 deaths (20 7%) arseniuretted hydrogen 59 with 14 deaths (23 7%) chlornaphthalene 3 all fatal paranitrochlorbenzene dinitrobenzene and trichlorethylene 1 each Total cases 595 with 153 deaths (25 7%)

In 1938, 5 cases of jaundice of obscure origin, of which 3 were fatal, occurred at an optical works, a radio works and in condenser assembling Contact in varying degree for 3½ to 9 months with chlorinated naphthalene wax, or the fume from the heated wax, was elicited. Three other workers were found to have complained of nausea, dizziness and drowsiness, and at the same time, the now well known "wax rash" was observed Three cases of toxic jaundice (all fatal) attributable to chlorinated naphthalene wax have been notified during this war in women over 29 years of age who were employed for 6–9 months in impregnating coils or in scraping the wax from metal parts. In one of the cases there was an interesting latent period of 6 weeks from the time of leaving work, mainly for domestic reasons to the manifestation of the jaundice So on June 1, 1941, poisoning by chlorinated naphthalene was added to the schedule of the Workmen's Compensation Act.

But at the present time trinitrotoluene is the most prominent cause of toxic jaundice, which occurs to some extent during manufacture of the product, but mainly during manipulation when mixing, or filling shells or other containers Fig 13 shows the quarterly incidence

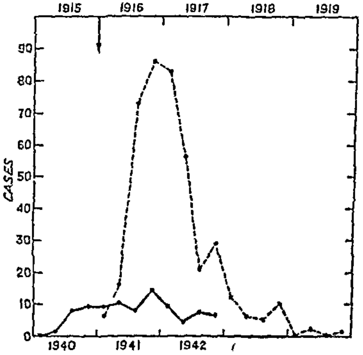

Fig 13—Cases of jaundice due to TNT notified during this war and the last compared Toxic jaundice became notifiable on Jan 1 1916

during this war compared with that for comparable years of the last war, when there were 404 cases, 30% in males and 70% in females, manufacture being responsible for only just under 1% In the period between the two wars there were only 12 cases, mostly in males manufacturing filling or breaking down old ammunition There were no cases in 1939 but since 1940 there have been 85 cases, under 39% in males and over 61% in females Manufacture was responsible for only 4 cases

Unfortunately it is impossible for various reasons to compare the incidence of cases with the number of workers exposed to risk, but it is probably fair and safe to say that the number of workers employed and exposed to risk has not been less and has increased at a comparable rate since 1939 as in the three years after 1914, hence the incidence appears to be substantially less in this war Exposure to risk before the onset of jaundice has varied from 2 or 3 weeks to 12 months for females and from 3 weeks to 15 months for males The average age of the 52 females affected during this war has been just over 30 years and that of the 33 males in the same period 40½ years, the youngest female being 18 and the youngest male 19

The lag period between the cessation of contact and the onset of jaundice has again been noted, 18 cases (22 1%) showing varying lag periods up to 9 weeks in males and 13½ weeks in females Of the 501 cases between 1916, when statutory notification of toxic jaundice came into force, to the end of 1942, 130, or just [illegible], the death rate for males [illegible] females just under 26% [illegible] ie, and its presence can be shown by Webster's test, but this unfortunately gives no indication of liver damage and only indicates contact A reliable test for early evidence of such damage is still awaited

Sir Thomas Legge, who considered skin absorption to be the important cause, visualised that the replacement of hand filling by machine filling would reduce the cases to a minimum, but unfortunately machine filling is not always fool proof and melted TNT gives off fume, and the view has been expressed in some quarters that inhalation of dust or fume plays a greater part in causation than was originally believed

In 1 of the cases of TNT jaundice a dyshæmopoietic anæmia was also present, and 5 cases of this type of anæmia without jaundice were observed in 1941 in male and female TNT workers Hence, after careful consideration, on March 1, 1942, a new notifiable disease—toxic anæmia—[illegible] existing list For the pur[illegible] term is intended to apply [illegible] without reference to any [illegible] a person employed in a process which brings him into contact with X rays radio active substances and any chemical compound which may be capable of causing this effect, thus leaving the door open for discovery of new causal agents

In modern industry, extended use is being made of radio active substances, and X rays for process

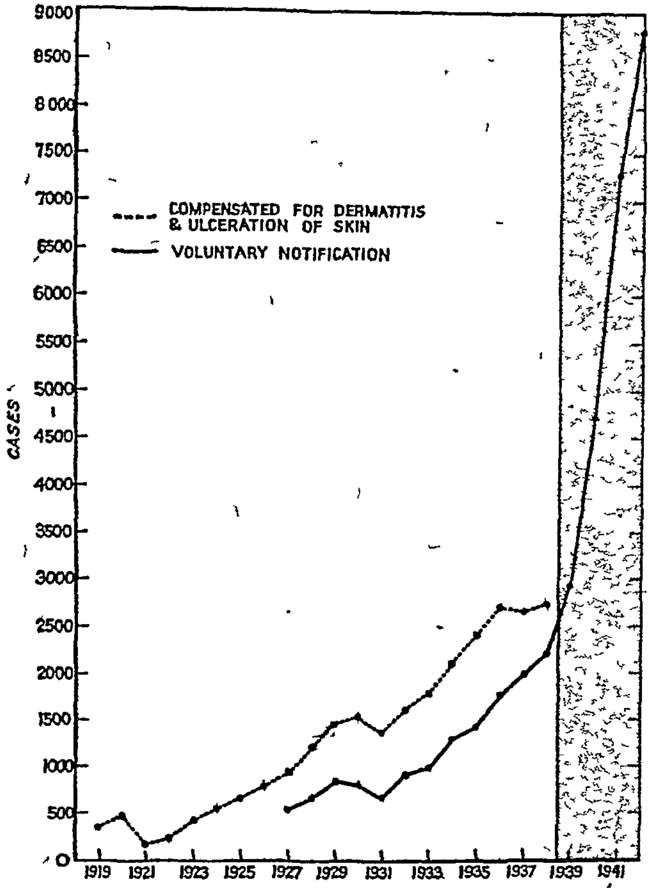

Fig. 14—Dermatitis produced by dust or liquids.

The effect on health is being carefully watched and preventive measures instituted on the advice of experts in radiology. In view of the great increase in the luminising of dials by a compound containing a radio-active substance—a process which had such dire results in New Jersey and to which Martland and his collaborators drew attention in 1925—the Factories (Luminising) (Health and Safety Provision) Order came into force on May 3, 1942. It regulates the conditions of work, provides initial and quarterly medical examination, prohibits employment under 16 years of age and for more than 48 hours a week and the introduction into the workroom of materials likely to become contaminated, including cosmetics other than those already applied. One temporary medical inspector with special pathological experience is devoting much of her time to proper enforcement of the order and to further inquiry, in cooperation with radiologists, into early effects on the blood and skin.

Since notification came into force 14 cases of toxic anæmia have been notified; 7, of which 3 were fatal, were attributable to contact with TNT for periods varying from 5 to 18 months. The youngest female was aged 22 and the youngest male 36. In the case of one male some 18 months elapsed after contact with TNT before the condition was observed. The other 7 cases were in women aged 28 and over employed for periods varying from 6 to 19 months in limited contact with benzene used in rubber solutions, and in one case, in aeroplane dope containing under 15%.

It may be argued that such cases might well have been cases of chronic benzene poisoning, but as the symptoms were mild and transient, in some cases only necessitating transfer to non-contact work, and as they did not present the classical later signs of purpura and hæmorrhage from the mucous membranes, they may possibly be considered as representing the earlier stage of benzene absorption requiring further study, thus exemplifying the value of making toxic anæmia a notifiable disease.

CHRONIC BENZENE POISONING

During the last war there were deaths from “ aplastic ” anæmia among men using a rubber solution containing crystallisable benzene during the building up of tyres, the benzene having replaced the usual naphtha which was required for other purposes. The picture was the classical one of dyshæmopoietic anæmia with purpura and hæmorrhages from the mucous membranes.

Eventually it was considered advisable to make chronic benzene poisoning a notifiable disease on Feb. 1, 1925, since when only 16 cases, 9 of which were fatal, have been reported, 7 having been reported since 1939. Probably there might have been more had not special attention been paid to substitution and ventilation in factories concerned. In 4 of the cases (apart from the blood picture of dyshæmopoietic anæmia) the post-mortem findings, or presence of purpura or bleeding from the mucous membranes, left no doubt as to the condition. The other 3 showed no signs of hæmorrhage, in fact, in one there was history of amenorrhœa, and possibly had toxic anæmia been a notifiable disease at the time it might have been considered advisable to place these 3 cases under that heading pending further knowledge.

DERMATITIS

I have previously referred to the inflammation of the skin caused by TNT; but that is only one of the innumerable agents responsible for “ dermatitis produced by dust or liquids ”—a condition, irritating to patient and doctor alike, which is not notifiable but subject to compensation. The precise legal term must be read in its *entirety* for the sake of compensation to the worker, for none of the words can be divorced from each other for purpose of certification by the certifying surgeon from whom the worker has to obtain a positive certificate before he can claim compensation. No alteration in wording can be made by the surgeon, even though in his purely scientific moments he feels sure that the cause is dust and not liquid, or vice versa. On the other hand, the term leaves a welcome loophole to those who cannot be quite so confident as to which is the cause if both types of causal agent are handled.

Voluntary notification of such dermatitis has been encouraged by the Factory Department for some years, and the cases coming to our notice seem, indeed, to constitute a fair sample of those arising annually in factories. This is borne out by a comparison of the number notified with the number receiving compensation, though the latter figure is only available to 1938; it must be appreciated, too, that the figures for compensation include many cases not arising on factory premises. Fig. 14 shows the progressive increase in number since 1927, and the significant rise during the war. But apart from the progressive knowledge and interest in the condition, we must bear in mind the introduction into industry of an increasing number of workers and causal agents, whether animal, vegetable or mineral.

When celery canning was first introduced celery dermatitis appeared, and new timbers have caused dermatitis in woodworking shops where previously it had been absent. On many occasions investigation of an excessive number of cases among workers in a particular factory has revealed the cause; and when appropriate measures have been devised, often with the help of the management, the so-called “ epidemic ” has ceased and not recurred.

Engineering accounts for nearly 23% of the cases, but if metal work, including welding, plating, and polishing is added, the percentage reaches 30·5. The most

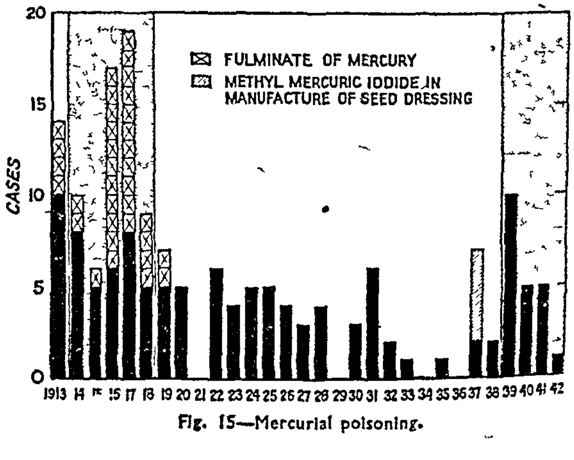

Fig. 15—Mercurial poisoning.

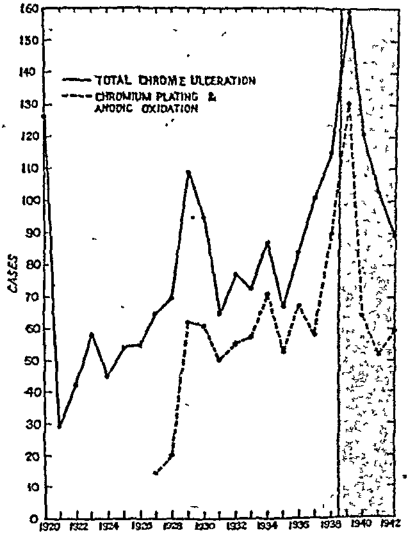

Fig. 16—Chrome ulceration.

significant increase during the war, however, is in connection with explosives [illegible] T.N.T. [illegible] of mercury, which are [illegible] number of cases since [illegible] as economic conditions, extent of contact and length of exposure, must be taken into consideration when attempting to prevent this condition.

The influence of past economic conditions on the incidence of dermatitis is strikingly exemplified by comparing the incidence in two factories where in both there was a hazard of dermatitis due to tetryl. In one, where incidence of dermatitis was negligible, tetryl had been manufactured for many years. Ample labour was available from an adequately nourished population from which a careful selection of suitable workers had been made. In the other factory the incidence of tetryl dermatitis was high (with consequent large turnover of labour) in spite of medical supervision, nursing facilities, and provision of good washing and cloakroom facilities. The factory was in an isolated position, a very large number of workers had to be obtained at short notice from a population in which many were under-nourished and [illegible] for years, and there was little [illegible]

[illegible] ence of length of exposure on [illegible] from one factory where artificial silk was manufactured by the cuprammonium process; 47 cases developed and length of exposure (most of the men being employed for 12 hours a day for 7 days a week) probably played the main part in causation. Since the number of hours has been reduced, only 1 case of dermatitis has been reported.

Recently an advisory panel on dermatitis in industry has been appointed, with Dr. Sibyl Horner as secretary, to advise the Ministry of Labour on matters affecting the question of dermatitis and, presumably, to share its burdens.

Among the 61 cases of mercurial poisoning (fig. 15) notified during the last war, 20 from the war-time manufacture of the explosive fulminate of mercury were included, but only an odd case or two really showed any of the well- [illegible] The clinica [illegible] dermatitis [illegible] tion of nasal and laryngeal mucous membranes.

During the present war the results of contact with fulminate of mercury have been mainly restricted to dermatitis, under which heading the cases have been classified and so are not represented in the 21 notified cases of mercurial poisoning, most of which were caused by the prewar processes of manufacture of thermometers and electric meters which have extended during the war. One, however, was due to phenyl mercuric acetate in the manufacture of a fungicide for seed dressing, but it is interesting that this product did not present the serious effects on the central nervous system which were caused in 5 cases in 1937 during the preparation of a seeding dressing containing methyl mercuric iodide, with its methyl radicle.

Poisoning by metallic mercury itself is one of the senior industrial diseases. About the year 1700 from Italy came Ramazzini's references to the typical salivation, tremors, stomatitis, and gastro-intestinal disturbance *among* those craftsmen engaged in water gilding in which an amalgam of mercury with gold or silver was used for decorating ornaments. During this process the mercury is volatilised by heat over a fire (hence also the term fire gilding) to leave the precious metals behind. So it is of interest that this ancient process was responsible for one case in 1939 in a female employed on gilding buttons for naval uniforms, the demand for which had greatly increased during the previous two or three months of that year.

Now in addition to fulminate of mercury, there are certain chemicals which, while sometimes causing a rash, may be more liable to give rise to an ulcer or ulcers localised and well defined, especially when the chemical enters an obvious abrasion. The main offenders are soda, brine, chromic acid and bichromates, giving rise to so-called "holes" on the skin, and, as with certain arsenical compounds, on the nasal septum, leading to perforation which, however, is practically never disabling. The fisher girls who in prewar days travelled from Scotland to the East coast to gut the fish during the herring-fishing season were liable to contract brine holes, a condition which is not notifiable but is subject to compensation under the heading of ulceration of the skin produced by dust or liquids. It may be some consolation to realise that any lack of herrings, under present circumstances, is compensated by absence of brine holes.

When such ulceration is caused by chromium compounds it is notifiable as "chrome ulceration," which is one of those conditions which, like the diffuse industrial rashes, can never be entirely prevented by regulations alone without the strictest supervision and the full cooperation of intelligent and educated workers in cleanliness of person and working methods.

Fig. 16 shows the distinct fall in the number of cases of chrome ulceration notified since 1939. Notification was introduced in 1920 because of the ill effect of the manufacture of bichromates. The introduction of the electrical methods of chromium plating and its opposite number anodic oxidation, led to an increase in notifications from 1927, while the introduction of a non-electrical process known as chromating of metals contributed from 1937. The main source of cases during the present war is, however, the chromium plating bath which is responsible for just under 43% of the cases, anodic oxidation contri [illegible] of bi-chromates 10%, and [illegible]

The fact that only a [illegible] em to have claimed and re [illegible] be ulceration which so oft [illegible] im does not cause disability; and even with ulceration on the skin the patient is often able to continue work after the dressing has been covered by a suitable waterproof plaster.

It has often been said of chrome ulceration that it is never fatal, and of chrome itself that, although it is one of the greatest skin irritants in industry, it has never been responsible for a case of epitheliomatous ulceration.

* * *

This brings me to the end of the beginning. In these days, when there are rumours of the dawn of a [illegible] era of social security, social justice, and [illegible] the words of Christopher Columbus when [illegible] San Salvador, re-echo from the past, and [illegible] in the calm atmosphere of this ancient college: "The time has come. There are [illegible] happening."

SUBCONJUNCTIVAL HÆMORRHAGE
CAUSED BY AEROBATIC FLYING

A. G. CROSS
M D CAMB, F R C S
SQUADRON-LEADER RAF

JOHN BALL
M D MANC
FLIGHT LIEUTENANT RAF

SUBCONJUNCTIVAL hæmorrhage is common and its causes are many. Direct trauma to the eye, any factor raising venous pressure in the head, blood diseases, inflammations of the conjunctiva, acute systemic infections like cholera and typhus, lack of vitamin C, and menstruation[1] may give rise to this striking, and to the inexperienced frightening, condition. United States publications[2] have recorded it following aerobatic flying, but we have seen no similar report in this country, apart from a case described in a personal communication from Air Commodore Livingston.

Sgt. A. B., aged 19, was on Oct. 6, 1942, performing aerobatics in a fast single-seater aircraft. He tried to perform a series of vertical rolls, but stalled at the beginning of the third repeat of this manœuvre. The plane immediately "flicked on to its back"; its nose dropped, and it started to fall vertically, turning at the same time, so that the pilot was spun round as in a centrifuge. He was forced up against the harness and he found that great exertion was necessary to move his arms in the direction of his feet while there was a great feeling of congestion in the head. In his own words, "my eyes felt as if they were ready to pop, and the flesh around them about to burst; my vision was poor, the appearance being like looking through frosted glass." Fifteen minutes later he was seen by his station medical officer, when, in addition to diplopia, he complained of pain behind the left eye and discomfort of the eyes on movement. Examination revealed crescents of subconjunctival hæmorrhage above and below the cornea in both eyes and no other abnormality. He was ordered to rest in bed. Next day the hæmorrhage had spread beneath the whole bulbar conjunctiva. All pain had subsided in twelve hours and the diplopia by the sixth day.

On Oct. 13 he was examined by an ophthalmic specialist. *The vision was 6/5 in each eye, there was no abnormality of* muscle balance, the media and fundi were normal. The subconjunctival hæmorrhage persisted, but was absorbed by the fifteenth day. On Oct. 19 he was examined by a physician who found no abnormality of the cardiovascular system and he was passed as fit for all flying duties. A blood-count taken at this time was within normal limits.

The position of the pilot during the descent of his plane in a spiral turn caused the blood to be forced into his head, resulting in a rise of venous and arterial blood-pressure in that region. It has long been recognised that subconjunctival vessels are fragile. Treves[3] said that "these vessels also being feebly supported, are prone to give way under no great provocation." In this case the subconjunctival vessels ruptured, with extensive bilateral hæmorrhage. The diplopia and orbital pain may have been due to hæmorrhage in the orbits, but there was no evidence of bleeding elsewhere, though massive cerebral hæmorrhage has been produced in animals by raising the blood-pressure in the head by centrifuging. Other signs that have been described in similar cases, but were not observed in this one, are distension of the arterioles of the face, petechial hæmorrhages under the skin in the region of the head and increased lacrimation. In traumatic asphyxia, which is the result of pressure applied to the thorax, there is a rise of venous and capillary pressure in the head, but it is probably more slowly induced and more prolonged than in the above case and hæmorrhages of the vitreous in addition to those of the subcutaneous and subconjunctival tissues occur.

The sensation of "seeing red" which is recognised in aviation medicine as associated with a rise of vascular pressure in the head, probably as a result of congestion of the retinal vessels, was not noticed here, though he complained of misty vision. This may have been due to a vascular upset of the central nervous mechanism of vision or to transient corneal œdema due to venous congestion. The opposite condition, "blacking out," occurs when, in a "tight" turn, the blood is sucked away from the head and pooled in the splanchnic region: inadequate blood-supply to the central nervous mechanism causes temporary blindness.

Subconjunctival hæmorrhage, in itself, is not a serious condition and absorption is always rapid and complete.

We should like to express our thanks to Air Marshal Sir Harold Whittingham, KBE, Director-General of RAF Medical Services, and to Air Commodore P. C. Livingston, OBE, AFC, for permission to publish details of this case.

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1. Duke-Elder, S. (1938) Textbook of Ophthalmology, London.
2. Armstrong, H. G. (1939) Aviation Medicine, Baltimore and London.
3. Treves, F. (1905) Surgical Applied Anatomy, London.

Medical Societies

ROYAL SOCIETY OF MEDICINE

THE Surgical Section met on Dec. 1, with Sir JAMES WALTON, the president, in the chair. Opening a discussion on

Modern Methods of Skin-grafting

Mr. RAINSFORD MOWLEM said that though there has been no recent change in the basic methods of skin-grafting, the use of the sulphonamides and improvements in technique have enabled plastic surgeons to get better results than they did a few years ago. This is especially true in the grafting of septic wounds. Attention must be paid to the bed on which the graft is to lie, and on the exertion of even pressure to hold the graft in contact with the bed. It is still true that to obtain the best results an aseptic, non-œdematous and vascular bed is necessary, but so great is the need for early grafting in the prevention of fibrosis that the surgeon is often induced to employ grafts on wounds which would once have been thought unsuitable. In such wounds Mr. Mowlem believes that sulphonamides may claim to have doubled the chances of success. In his unit they use two types of graft: the split-skin graft and the whole-skin graft. They no longer use the pinch-graft. The cutting of the split-graft from difficult areas, such as the chest wall, has been made possible by the use of the drum (see *Lancet*, 1943, i, 532), a method which depends for its efficiency on the quality of the rubber solution used to stick the donor area to the drum; since rubber solutions vary, it is not a fool-proof apparatus. Where the texture of the skin matters, as on the face, whole-skin grafts are employed. These are non-contractile, and are therefore particularly suitable for the flexor surfaces of the fingers and the palm of the hand. In dissecting whole-skin grafts, all fat should be removed from the deep surface. The graft must accurately fit the area for which it is designed. They naturally destroy the donor area, and this may be a serious disadvantage in cases needing extensive grafts. Fixation of the graft is important; he sews the graft to the edges of the bed by a ring of silk stitches, leaving one end of each stitch long. Over the graft a mould, made of numerous small pledgets of cotton-wool soaked in liquid paraffin and flavine, is applied piece by piece, in such a way that it overlaps the graft by ½ in. all round. The long ends of the ring of stitches are tied across the mould. Thus the graft is pressed down and the edges of the bed are stretched upwards, so that close contact is ensured between the two surfaces. Both the patient and the bed which is to receive the graft must be prepared beforehand. Vitamin C and an ample diet raise the healing power of the patient; patients with large raw areas often show a severe degree of anæmia; but it is little use to try to cure this until the surface is grafted. Mr. Mowlem's practice is to transfuse at the time of the operation or immediately after it. Dehydration also deserves serious attention. The old method of preparing the graft bed with saline baths and ultraviolet radiation has, since 1940, been replaced by surface dressing with sulphanilamide powder, and by this means septic wounds can be made ready for grafting in less than 30 days. The powder is also applied beneath the graft at the time of operation. Success then depends on the infecting streptococcus not being resistant to sulphanilamide. *B. pyocyaneus* and *B. proteus* have both proved resistant, and may produce exudates which float the graft off its bed. He noted the importance of early grafting as a means of healing a septic wound, thus rendering possible earlier approach to parts underlying the wound. In non-septic wounds, his unit can show 94% of good takes, as compared with 83% in the earlier figures published by Rank. In septic wounds the improvement is 79% as against Rank's 41%. His criterion of a "good take" is 75% of the graft taken.

Mr. P. H. Jayes dealt with whole-skin grafting, and particularly with the use of skin-flaps in the repair of facial injuries. All surgeons called on to do traumatic surgery, he said, should be familiar with the technique of the free graft; skin-flaps have little place in immediate repair, but he sees great advantages in the initial treatment being carried out by the surgeon who will undertake the final plastic operations, and advocates the mobile plastic team. In reconstruction of the face, an immediate Thiersch graft is often used to cover a defect and promote rapid healing; when this is replaced by flap-grafting later, the absence of fibrosis is of great advantage. He showed photographs of the stages of repair in very severe facial injuries; flaps from the forehead have proved particularly successful.

Dr A. H. T. R[illegible] dono[illegible] in the [illegible] adva[illegible] seen proceeding from the sweat ducts and glands, and from the hair follicles. Epithelialisation is quicker when it arises from hair follicles and slower in cases where the graft taken has been thick. In these deeper wounds the growth of elasti[illegible] perfect.

Dr. P. Gabarr[illegible] "chess-board" grafting. [illegible] sheet of sticky paper (such as that covering layers of tulle-gras) [illegible] be applied in an hour. The method is useful where the possible donor area is limited, and has the advantage of [illegible] the growing edges of the graft many times.

[illegible] Gillies thought that the team work now [illegible]-grafting largely accounts for the improvement in results. Referring to histological work on the growth of grafts, he said that it has never been settled how the individual cells grow—how many cells, for example, can one cell produce? He thought Dr. Gabarro's method of piecemeal grafting excellent, and such methods of using split-grafts render pinch-grafts unnecessary.

The President noted that the rate of growth of the graft is important, because epithelial cells eventually revert to fibroblasts.

Mr. Mowlem, replying, said he has no real objection to wet dressings, but has found his paraffin dressing very satisfactory. He does not believe it necessary to puncture the graft, because efficient pressure for 5–6 days precludes the need for drainage.

Perspective in Anæsthesia

At a meeting of the Section of Anæsthetics on Dec. 3 Dr. I. W. Magill read a paper entitled: *Is a proper perspective being lost by anæsthetists today?* Taking as his text the welfare of the patient, he showed how present-day anæsthesia often diverges from this end—for example, he maintained that the teaching of anæsthesia is poor in both substance and aim. Many [illegible] in war, if a doctor could use one or two simple methods with safety, for while he is not expected to cope with major surgery it is tacitly assumed he is fully qualified to undertake major anæsthesia. Preoperative sedation is often a hindrance and sometimes a danger. The dose of sedative drug should not be excessive and it should be given at [illegible] depression may hamper the [illegible] and maintenance, and [illegible] may become common. Basal narcosis is often given to pamper the patient rather than as something directed towards his welfare. He deprecated the use of 'Pentothal' before administering a spinal anæsthetic in the sitting position. On the subject of endotracheal anæsthesia, Dr. Magill had changed his original views and now felt that blind nasal intubation should be reserved for cases where oral intubation is contra-indicated; it should not be used for children or when an oral airway would suffice. Its use to enable a lazy anæsthetist to wander in and out of the theatre is to be condemned whole-heartedly, for it is not free from risk. It has earned a good deal of disrepute because of the "hard work of bad prodders who fail to use the laryngoscope and admit defeat." Dr. Magill deplored the use of one agent to the exclusion of [illegible] agents—a balanced [illegible]. He cited the [illegible] of pentothal or cyclopropane, and pointed out how the judicious addition of ether can often prevent their abuse.

Dr. Langton Hewer stressed the importance of teaching in the attainment of a high standard of anæsthesia. The most useful method from the student's point of view is not always the best from the patient's.

Prof. R. R. Macintosh said that in travelling about the country he had found [illegible] for [illegible] and [illegible] con[illegible] necessarily, but they are often too narrow to provide adequate ventilation. He stressed the importance of the economic factor in attracting the right people to anæsthesia. Unless the rewards are adequate men of the best mental calibre will not take up this branch of medicine.

Dr. M. D. Nosworthy pointed out the dangers of teaching students what are fundamentally "stunt" methods, which may [illegible] and Dr. Magill agreed.

Dr. Geoffrey Organe and Dr. F. B. Mallinson defended modern methods, and asked what should be done if a surgeon demanded a particular anæsthetic which the anæsthetist did not believe to be the best for that case.—Dr. Magill advised a change of surgeon.

Dr. Ronald Jarman said he had anæsthetised over 700 patients for abdominoperineal resection of the rectum, by first putting them to sleep with pentothal and then giving a spinal in the sitting-up position. He had had five deaths.

New Inventions

PULSATOR VACUUM BOX

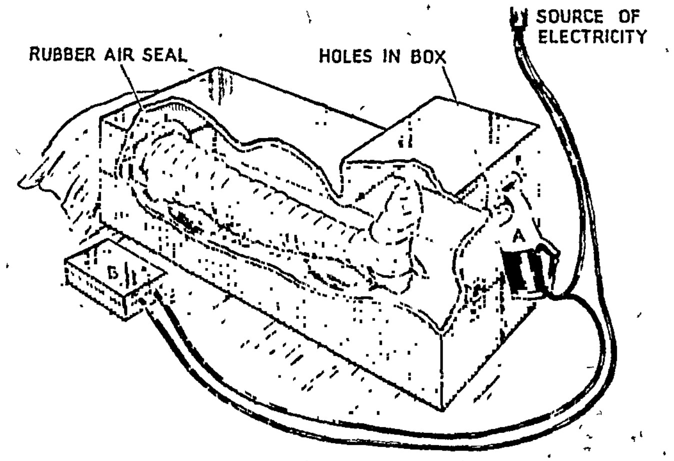
FOR TREATING PERIPHERAL VASCULAR DISEASE

Th[illegible] illustrated was devised for the [illegible] negative pressure to one or [illegible] of peripheral disease. A Hoover 'Dustette' vacuum cleaner produces a negative pressure in the box sufficient to raise a column of water 34 cm. A clockwork contact-breaker makes and breaks the circuit every five seconds. When the circuit is broken air rushes back into the box past the vanes of the dustette fan. The negative pressure is therefore built up for five seconds and the pressure then rapidly returns to atmospheric during the next five seconds. The following case-notes will illustrate the mode of action and results attained.

Case 1.—A man of 60 had undergone considerable privations in Spain. Malnutrition, and calcification of the arteries of both legs had combined to produce severe attacks of cramp for several years. An accident, in January, 1943, in which the great toe of the left foot was injured, resulted in an extensive gangrenous condition of the left foot and leg; the right foot was also mildly affected. I first saw the patient in March when he arrived in England. He was extremely depressed and suffering great pain in both legs. On the left side, the dorsum of the foot was œdematous; the great [illegible] and absolutely cold, with the skin broken in many places. The right foot was œdematous, and the right leg up to the knee was in the same condition as the left. X rays showed all the arteries as calcified tubes. Amputation through both thighs had been advised both abroad and in England.

Both limbs were sealed in the box and the mechanism set in action, first for 20 min. daily and afterwards for increasing periods up to 3 hours daily. After 2 months the black gangrenous casing of the second and third toes burst and healthy skin was seen to be growing underneath. A line of demarcation formed at the root of the great-toe which was then amputated. The wound healed rapidly. Both legs regained normal sensation and movement and both dorsalis pedis arteries could be felt pulsating. The man was able to stand after 3 months' treatment and he is now walking normally. The arteries of the limbs can no longer be detected on X-ray examination.

CASE 2.—A woman of 53, a diabetic who had given up her diet for several months. She had developed rapidly spreading wet gangrene of both feet, affecting chiefly the great toes, but spreading up to the middle third of both legs, which were cold and œdematous. She was put back on her diet and brought into insulin balance. The pulsator vacuum box was used on both legs, starting with ½ hour daily and rapidly working up to 3 hours. In 6 weeks the gangrenous areas of skin, which had dried, shelled off, leaving healthy skin underneath. After 2 months the patient was walking normally.



Pulsator vacuum box in action. A. Hoover dustette clamped on box; part of the nozzle is shown cut away to disclose holes through which dustette communicates with the inside of the box. B. Box containing clockwork contact-breaker making contact for 5 sec. and breaking for 5 sec. The joint between the base and lid of the box is airtight.

CASE 3.—A woman of 50 had a varicose ulcer measuring 4 in. by 3 in. which had troubled her for 20 years, never healing over. The pulsator vacuum box was applied to the affected leg daily, starting with ½ hour and rapidly increasing to 2 hours. The ulcer quickly cleaned and was completely covered by firm healthy skin in three weeks.

These results were most gratifying, and the apparatus should prove useful in a variety of vascular disorders.

E. O. LAKEY, MRCS.

Reviews of Books

Conscience and Society

RANYARD WEST, DM, DPHIL OXFD. (Methuen. Pp. 260. 15*s*.)

BELIEVING that there are certain simple facts of human nature which can be inferred from philosophy, psychology and jurisprudence, but which have been as yet inadequately interpreted, Dr. West sets out to show how a total human society might be built. Much of his argument turns upon a criticism of Freud's views about aggression: he is convinced that Freud had himself an obsessional character which biased his judgment and particularly coloured his theories about hate. Dr. West holds that men need the external control for their aggressiveness which law provides, and that moral obligations cannot be a substitute for this. He pleads, therefore, for a world court utilising loyalty to a Total Society, and built upon agreement between us and our enemies. He refuses, because of his clinical observations as a psychotherapist, to accept the view that there are hidden springs of cruelty and hate in human beings, though he recognises that a "people's revolution against nationalism" or any other method of securing world-wide law and order would have to mobilise forces strong enough to maintain itself against attack. The thesis is elaborately developed, with much erudition and skill. Dr. West shows that psychological theories derived from study of the individual can be intelligently applied to the problem of a world society; whether the application would also be profitable and wise cannot now be decided, save by the event. The marriage of a scientifically established psychology of human nature to a sagacious political philosophy is not yet consummated, however devoutly this is to be wished: neither partner is nubile.

A Synopsis of Regional Anatomy

(5th ed.) T. B. JOHNSTON, MD. (Churchill. Pp. 424. 16*s*.)

THE fact that a new issue of this little book is demanded after an interval of only four years is evidence of its utility to the student who wishes to refresh his memory of the details of topographical anatomy. The new matter included in this edition consists, we are told, almost exclusively, of additional references to the functional aspects of the subject. Some of this functional anatomy is, however, a little vulnerable—for example, the statement: "It must be observed that the palmar aponeurosis gives no slip to the thumb, in contradistinction to the arrangement in the foot. The wide range of the thumb, which is in part due to this fact, is characteristic of the human hand." In a book in which the whole structure of the human body is described in so small a compass, some dogmatism is imperative; but it is somewhat daring to insist that "the subpubic angle in the female pelvis always admits a set square, but in the male pelvis it is always less than 90°." It is not for these things, however, but rather for the abbreviated account of the commonly accepted facts of topographical anatomy that this little book maintains its popularity.

Pictorial Handbook of Fracture Treatment

EDWARD L. COMPERE, MD, FACS, associate professor of surgery, Northwestern University, Chicago; SAMUEL W. MARKS, MD, associate in surgery in the university. (Year Book Publishers; Lewis. Pp. 340. 27*s*.)

IN this book, small and easy to handle, the authors have described the methods of fracture treatment which they have found most useful. The text is brief but well written, and the illustrations good. Operative methods appear at first sight to receive undue prominence, but non-operative methods are adequately described. Face and skull fractures are dealt with rather sketchily in a few pages. For internal fixation they have found many uses for threaded stainless steel pins of small diameter, and use four of these for femoral neck fractures. Unpadded plaster casts do not seem to be used. This should be a useful handbook for student or practitioner.

Advances in Enzymology and Related Subjects of Biochemistry

(Vol. III.) F. F. NORD, Fordham University, New York; C. H. WERKMAN, Iowa State College. (Interscience Publishers. Pp. 408. $5.50.)

THE subject of enzymology has made considerable advances in recent years, and Nord and Werkman's treatise is perhaps the most up-to-date summary of the present position. The frontispiece is a charming picture of Willstätter, and there is an appropriate quotation, from Arthur Stoll, on his work. The articles cover a great deal of ground including among other things chromosomes and nucleoproteins, the effects of temperature on enzyme kinetics, X rays and the stoichiometry of the proteins, verdoperoxidase, recent progress in tumour enzymology, and the rôle of micro-organisms and enzymes in wine making. The reviews are well written, though naturally difficult to follow for those not familiar with the details of each subject. The complex bibliography indicates the astonishing growth in our knowledge within the last few years—a point well illustrated by the good chapter on carbohydrate metabolism by Guzman Barron.

Diseases of the Skin

(6th ed.) OLIVER S. ORMSBY, MD; HAMILTON MONTGOMERY, MD, MS. (Kimpton. Pp. 1360. 70*s*.)

AFTER six years a new edition of one of the standard textbooks on skin diseases is welcome. There has been no alteration in classification which has always seemed one of the soundest features of this work. Much new matter has been incorporated, but the cutting of out-of-date material has perhaps not been quite ruthless enough. For example, in the treatment of erysipelas a long account of serum therapy is given, while only three lines are devoted to sulphanilamide, with no details of dosage. The make-up of the book is as good as ever, and six really beautiful coloured plates have been added.

THE LANCET

LONDON: SATURDAY, DECEMBER 18, 1943

INFANTILE D AND V

Enteritis kills more children under the age of 6 months than any other infection except pneumonia. It is the most dreaded of hospital cross-infections. No doubt the steady fall in annual deaths from 36,000 fifty years ago to 3000–4000 in recent years has helped to divert attention from the apparently insoluble problems which this disease presents, but some recent happenings have brought it again into high light. Among these are the reported outbreaks of neonatal diarrhœa, an increased prevalence of gastro-enteritis during the spring of this year, and a greater consciousness of the unsatisfactory infantile mortality-rates that still prevail among the poor. The outstanding epidemiological features of infantile diarrhœa and vomiting, which masquerades under many synonyms, are summed up in its preponderance among artificially fed infants of urban poor-class districts. "Summer diarrhœa" would now be regarded as a misnomer, but it must not be forgotten that the infection used regularly to recur in epidemic waves during the late summer, and that the greater number of cases still fall between June and October. Its control demands much concerted investigation and enlightened propaganda directed particularly towards ætiology, treatment and prevention.

This apparently non-specific enteritis exhibits many of the features of an infectious disease; yet much painstaking research has failed to reveal any generally accepted causal organism, although a variety of bacteria, among them Morgan's bacillus, proteus, pyocyaneus, the paracolon group and *Clostridium welchii*, have had their supporters. Only a minority of cases can be attributed to specific pathogens like the salmonellas and the dysentery group. A virus affecting the parasympathetic ganglia leading to abnormal intestinal peristalsis has been postulated,[1] while the possibility of toxic split-products being formed from milk proteins by intestinal bacteria that have acquired abnormal enzymic activity[2] cannot be ruled out. Indeed the frequent liver damage seen at autopsy suggests that some toxic substance is absorbed from the gut; yet inflammatory reaction in the bowel mucosa is usually minimal or absent. These hypotheses are built on the assumption that the disorder is primarily in the alimentary tract, to which its preponderance in artificially fed infants (in different recorded groups[3,4] less than 5% were breast-fed) and its pristine summer prevalence give support. But there are many adherents to the view, advocated by McKim Marriott, that the gastro-intestinal symptoms are infection of the respiratory system—otitis media and mastoiditis, upper respiratory catarrh, bronchitis and bronchopneumonia. Evans,[5] for example, noted that ward outbreaks of non-specific diarrhœa among infants coincided with an unusual prevalence of respiratory infections among older children, while unequivocal parenteral infection at onset has been noted in 30–50% of cases by different workers.[4] Leathart[6] has lately maintained that mastoidectomy is justifiable in the infant with gastro-enteritis who is going steadily downhill, and certainly the operation is often followed by remarkable recoveries. The minor epidemic wave this spring may also be cited as evidence supporting a primary respiratory infection, although a plague of flies at the time may have contributed to the spread.

Treatment of infantile D and V has not advanced notably in the past decade or two. The different standards of assessment of severity make it difficult to compare the results of different methods of treatment, and the adoption of certain objective criteria is an essential prerequisite in any investigation.[7] Even so, the published figures indicate that the fatality-rate among dehydrated infants under 9 months is usually over 50%. A preliminary examination of the blood chemistry (chlorides, alkali reserve, plasma-proteins) and evidence of hæmoconcentration will help to decide the child's fluid needs. Fortunately the intravenous drip has now become a routine procedure, and the dehydration plus the diminution in chlorides and bicarbonate which is usually found in infants with D and V can best be rectified by Hartmann's half-strength Ringer-lactate solution with or without glucose, followed if need be by plasma or serum. The poor capacity of the infant kidney to concentrate waste or excrete chlorides must not be forgotten[8]; œdema of the tissues, in particular of the brain, is too common an autopsy finding in these cases. Even with the most assiduous attention, however, some infants show temporary improvement only to relapse in a way suggesting that some irreversible change in the tissues has deprived them of the faculty of utilising water and minerals. It must be the duty of all concerned to prevent the child reaching this stage, [illegible] ntravenous [illegible] Regular [illegible] o success. [illegible] by mouth should follow the lines recommended by Field and others.[7] The rôle of sulphonamides in the treatment of gastro-enteritis is still ill-defined. Where there is parenteral infection a soluble and relatively non-toxic drug like sulphamezathine should be used. Succinyl-sulphathiazole deserves a trial in view of its inhibitory effect on the coliform group. Good results with it[9] and with sulphaguanidine have been reported in small groups of cases of neonatal diarrhœa.

Obviously if progress is to be made in the control of gastro-enteritis the paramount need is for prevention—prevention in institutions[11] and prevention in

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[illegible] 1941, 16, 211.

[illegible] Dis. Child.

5. Evans, P. *Ibid*, 1942, 17, 130.
6. Leathart, P. W. *Brit. med. J.* 1943, ii, 168.
7. Field, C. E., MacCarthy, D. and Wyllie, W. G. *Ibid*, 194
8. Young, W. F. *Proc. R. Soc. Med.* 1943, 36, 219.
9. Twyman, A. H. and Horton, G. R. *J. Amer. med.* 123, 138.
10. Henderson, J. L. *Brit. med. J.* 1943, i, 410.
11. See Mitman, M. Control of Common Fevers, Lond p. 259.

poor-class homes. In hospital, open wards containing a large proportion of children under 2 years of age must be avoided, for they can be veritable death-traps if enteritis is introduced. Great Ormond Street, and certain Scandinavian and American hospitals have solved the problem of enteritis as a hospital infection by providing cubicle isolation for every infant under a year. Isolation accommodation is desirable for all infants admitted with gastro-enteritis, for the danger of relapse in open wards, besides the risk of cross-infection, is considerable. Only the more severely ill cases should be taken into hospital. Prevention would be largely achieved if all mothers could breast-feed their babies for 6–9 months. The fact that only 30–50% of mothers feed their infants for even 3 months is due to a variety of causes. As CRUICKSHANK[12] says, "A longer period of rest after confinement, more home help, proper feeding of the mother, the care of the nipples before confinement, more frequent and complete emptying of the breasts during feeding to stimulate lactation and prevent infection through milk-stasis, and, in particular, education of both doctors and the lay public about the advantages of breast-feeding, would all help to secure proper lactation and thus save a large proportion of the 3000 infants who die every year because they are not breast-fed." Bottle-feeding in the newborn requires a vigorous ritual and a standard of aseptic technique as high as that of the operating table or the labour ward.

The report by SAKULA on an outbreak of neonatal diarrhœa (p. 758) further emphasises the risk attendant on artificial feeding of young infants. Not one of 12 babies who were wholly breast-fed contracted the infection, whereas all of 18 artificially fed infants became infected and 15 of them died. Similar findings were reported by CRAIG.[13] In two outbreaks described by ORMISTON[14] only 7 of 51 affected breast-fed, compared with 20 of 30 artificially fed infants died in one maternity home, while in the other all the affected infants (case-fatality 38%) were artificially fed. There is a tendency to regard neonatal diarrhœa as a disease sui generis, but it has many clinical and pathological features in common with the D and V of older infants and its ætiology is equally obscure. Here is a problem of the first magnitude requiring concerted effort by teams of pediatrician, bacteriologist and biochemist working in close cooperation.

TYPHUS VACCINES

A CRUCIAL EXPERIMENT

PRESENT knowledge of the value of typhus vaccines made from killed rickettsiæ may be summarised briefly. The Weigl vaccine made from the intestines of infected lice has been proved to have some practical value in the field, but it is very difficult and costly to make: lice have to be infected and then reared on typhus-immune persons, and as many as 100 or 200 lice may be required to provide enough vaccine for one subject. Other sources of vaccine are yolk-sacs of infected developing eggs (Cox) and lung suspensions from infected mice, rabbits or dogs. All these yield abundant rickettsiæ and are promising in the laboratory. They are far easier to prepare than the Weigl vaccine; especially is this true of the egg vaccine which is being made on a large scale across the Atlantic. We do not yet know, however, how far they protect man from naturally contracted infection. Though they probably reduce the severity of the disease, they are not 100% perfect in preventing infection of typhus workers heavily exposed in the laboratory; but neither apparently does the Weigl vaccine meet this severe test.

Now appears a paper from Germany[1] which seems to answer all our queries. Groups of persons were inoculated with one or other of six vaccines: (i) louse-gut vaccine (Weigl); (ii) egg-yolk vaccine (Cox) made at the Robert Koch Institute, Berlin; (iii) and (iv) weaker preparations of egg-yolk vaccine made at Marburg and containing murine as well as epidemic rickettsiæ; (v) rabbit-lung vaccine made in Paris (Giroud); and (vi) dog-lung vaccine from Rumania (Combiescu). The incidence and severity of typhus in the six inoculated and in two control groups are recorded. Age and other factors were comparable in the various groups; the vaccination had been carried out, in the inoculated groups, 6 to 8 weeks previously. The results were clear: the weaker egg vaccines from Marburg and the Rumanian dog vaccine were less effective than the others, but essentially there was no difference between the results obtained with louse, egg and rabbit-lung vaccines. No deaths occurred in those receiving any of the vaccines except the Marburg ones, whereas the fatality-rates in the two control groups were 33% and 20%. The incidence of the disease was unaffected by inoculation, but its severity was much reduced as judged by height and duration of fever, extent and duration of rash, loss of weight, severity of circulatory and nervous symptoms, and incidence of complications. We draw the important conclusion that the egg vaccines, on which Britain and the United States are relying, are, if not ideal, at least as good as those of any other type.

Apart from its more obvious conclusions, this paper contains other significant information. First, its author, Dr. ERWIN DING, describes himself as a storm-troop leader. Secondly he quotes percentages throughout, but carefully refrains from stating how many persons there were in each group. Study of the percentage figures reveals that the groups must have been large, each comprising at least 20 to 50, and possibly many more; an incidence of complications of 0·5% (table 7) suggests a number of the order of 200 in at least one group; and we may deduce that several hundreds were involved altogether. Thirdly, he only includes, in this study of some hundreds, those people concerning whom he accurately knows the day of infection; which information would, one would imagine, be rarely obtainable in the ordinary course of events. Fourthly, the incubation period was far shorter than is accepted for typhus, being as little as 2 to 3 days for most of his controls, and not much longer for the inoculated. Thus, it seems that particularly heavy infections occurred in some hundreds of persons on known days during the investigations of a storm-troop leader. We leave our readers to make their own deductions.

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[12] Cruickshank, R. *Brit. med. J.* 1943, ii, 159.
[13] Craig, W. S. *Lancet*, 1936, ii, 68.
[14] Ormiston, G. *Ibid*, 1941, ii, 588.

[1] *Z. Hyg.* 1943, 124, 670.

WORK FOR THE DISABLED

IT was fitting that Mr. TOMLINSON should introduce the second reading of the Disabled Persons (Employment) Bill, for the bill is based directly on the report made under his chairmanship by the Inter-departmental Committee on the Rehabilitation and Resettlement of Disabled Persons. This report discussed rehabilitation under three distinct headings—medical rehabilitation, post-hospital rehabilitation, and resettlement. The first covers the treatment given before the patient becomes fit (in theory) for any form of vocational training or reconditioning, and this stage of rehabilitation is not mentioned in the bill. Post-hospital rehabilitation, bridging "the gap between the completion of hospital treatment and fitness for employment or occupation within the scope of the disablement," is dealt with in clauses 2–5 which suggest machinery for the establishment of vocational training courses and of industrial rehabilitation courses and for the care of the disabled attending these courses. It is specifically stated that such persons shall be "under adequate medical supervision," and it may be presumed that the medical supervision will be provided by the Ministry of Labour, since no mention is made in the relevant sections of any other Government department except the Treasury. The facilities mentioned under these clauses are in fact already available and form a substantial part of the Ministry of Labour's interim scheme for the training and resettlement of disabled persons, introduced in October, 1941. The practical value of the scheme, although operated on all too small a scale, has been abundantly proved, and if in war-time it could have been more widely applied and more widely advertised it is possible that the more controversial part of the bill would not have been thought necessary. This part concerns the third phase of rehabilitation, named in the Tomlinson report "resettlement."

The Tomlinson Committee formed the opinion that in spite of medical rehabilitation and post-hospital rehabilitation a substantial number of the disabled would remain unable to secure satisfactory employment. In order to protect them they made three recommendations, which are now incorporated in the bill, namely: (*a*) the introduction of a quota of disabled persons, and the imposition upon employers who do not satisfy the quota of a restriction on the engagement of workers; (*b*) the scheduling of certain occupations for the benefit of disabled persons; and (*c*) the creation of a *Register of Persons Handicapped by Disablement*. Any employer who has 25 or more employees will be required to employ a certain proportion of disabled persons, the actual number depending on a standard fixed for different types of work by an Order made by the Minister after consultation with organisations representing employers and workers. To satisfy the terms of the quota the employment must be given to persons who are on the register of handicapped persons. With the exception of pensioners of the last war, whose names are entered automatically, entry to the register can only be obtained after application by the person concerned; and that means that a disabled man—say with an artificial leg—would not count towards his employer's quota unless he had previously had his name entered on the register. The scheduling of certain occupations so that vacancies in them shall in future be filled only by registered persons is of course a less novel idea. In Japan the practice of massage was restricted by law to the blind: the blind masseur paraded the street ringing a bell to advertise his whereabouts and his calling.

The Tomlinson Committee's proposals for a register, quota and schedule of occupations have not passed without criticism. Last March representatives of various training colleges for the disabled wrote to the *Times* expressing their conviction that "Success in the rehabilitation of the disabled depends very largely upon the burning desire each of them possesses to be an object neither for sympathy nor for charity, but able to work independently for a living and to hold down his job by his own merit as a workman." The same conviction appears in a memorandum by the Central Council for the Care of Cripples, which points out that the report was made by a committee of civil servants who were specifically forbidden to take evidence and therefore had to "make proposals" from their own personal knowledge. It was surprising to find that the committee had no members with long personal experience of the training and employment of the disabled. Indeed they emphasised their own lack of expert knowledge by drawing attention to the need for more information as to the suitability of particular disablements to particular occupations and suggesting that "the Ministry of Labour and National Service should examine this question and consider what would be the best way of collecting the information and making it available to the Employment Exchanges."

Actually much of this information was already available, and if the information had been before the committee they might not have made the recommendations of quota, register, and schedule. Apart from the work of individuals in this country, a vast amount of research has been done in the United States of America; for example the United States *Civil Service Commission* lists some 20,000 jobs practised by persons with disabilities. The success of the work of rehabilitation by the State Departments on the lines covered by clauses 2–5 of the bill was such that last May the United States Office of Education, in a comprehensive analysis of the Employment Efficiency of Physically Impaired Workers, said:

> "Replies were received from more than 100 employers, most of whom are large corporations engaged in the manufacture of war materials and equipment and are employers of a considerable number of persons with physical impairments. These replies indicate, *conclusively, that physically impaired workers produce as* much or possibly a little more than the able-bodied workers. More significant, however, is the practically unanimous report that the handicapped are dependable, regular in attendance, and careful in observance of safety regulations.
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> "Of the employers reporting on these points, 99% said the handicapped worker sticks to his job as well as or better than the able-bodied worker, and 95% reported that their attendance record is as good as or better than that of the able-bodied. Only 2% of the employers have found their handicapped workers to be more accident-prone than the able-bodied. More than half of the employers reported their handicapped workers to be *definitely better* than the able-bodied in respect to frequency rates for turn-over, absenteeism, and accidents."

Broadly speaking, the results of these investigations show that if a person has the stamina to remain at work during normal working hours, it is possible to place him, with or without special training, in remunerative employment where he can earn his living on equal terms with the able-bodied. The great difficulty is to persuade the employer to give the man a chance. In Mr. BEVIN's bill the employer will be compulsorily persuaded. From the point of view of the injured person this is unfortunate and may even be disastrous, for both employer and disabled will become "cripple-minded"—the employer because he is forced to take labour which through ignorance he instinctively distrusts, and the employee because he knows he is a marked man, distrusted and resented by his employer. The disabled man deserves of the state something better than this, and this something can only be provided if he has a willing employer and if the conditions of service are such that he can give willing service.

The register, the quota and the schedule are just another method of providing pensions and they will always be regarded as such. What is needed is a big *educational campaign* to teach the disabled, the employers, fellow workers, doctors and public, that almost every disabled person can, if given a fair chance, be rehabilitated to earn his living in the open labour market in competition with the able-bodied. There will be an exceedingly small residue who are untrainable, and these should be permanently withdrawn from the open labour market and employed in sheltered occupations directly controlled by the state.

Annotations

PARLIAMENTARY MEDICAL COMMITTEE

AT its first meeting in the new session the Parliamentary Medical Committee elected the following officers:

Dr. A. B. Howitt, chairman.
Prof. A. V. Hill, SC D, FRS, and Major B. Neven-Spence, joint vice-chairmen.
Sir Henry Morris-Jones, treasurer.
Mr. H. Linstead, PH C, secretary.
Dr. Haden Guest will serve as representative on the Central Medical War Committee; he and Sir H. Morris-Jones on the Medical Planning Committee.

Dr. Howitt's elevation to the chair follows on his devoted service over many years in the office of secretary. It has always been the practice of the committee to extend a welcome to University representatives, and Professor Hill brings the prestige of an ex-holder of a chair of physiology and a joint secretary of the Royal Society. Mr. Linstead's presence will ensure happy relations with the pharmaceutical profession. The committee is now in a position to take an active part in the discussions on the Government's proposals for the setting up of a comprehensive medical service. We may well hope that it will extend its influence in the House of Commons to all matters with which the medical services are concerned.

PURE KIDNEY FACTORS

THE pharmacological work arising out of Goldblatt's discovery of the relation between renal ischæmia and hypertension has been extensive. The most important investigations have been those of Braun-Menendez in the Argentine and of Page in Indianapolis, with their respective collaborators. Using the South American terminology which seems simpler and more logical than Page's it is now established that renin acts on a globulin (hypertensinogen) in the blood to produce hypertensin, which is the actual substance responsible for the vasoconstrictor properties of renin. A substance hypertensinase has also been demonstrated which inactivates hypertensin. These various factors are now the objects of chemical investigation. Katz and Goldblatt[1] have obtained a sample of renin from hog kidneys by extraction in alkaline solution and subsequent treatment with trichloracetic acid, acetone, ethyl alcohol and ammonium sulphate precipitation. There is an activity of 4 dog units per mg. of nitrogen in the crude extract and 130 dog units per mg. in the final product, which is about 6 times more active than the most potent extract previously described, and chemical investigations show the product to be a protein. Preliminary investigation of its purity by Tiselius electrophoresis suggests that it is homogeneous. Its pharmacological properties are the same as those of crude samples of renin. It is an interesting fact that the pure compound has no effect on the blood-pressure in human beings. The South American workers originally suggested[2] that the production of hypertension from hypertensinogen is an enzymic reaction, and that hypertensin is a proteose or polypeptide. This conclusion has been confirmed by a group of Scandinavian workers,[3] and the enzymic nature of the reaction has been demonstrated and studied in some detail by Plentl and Page.[4] These latter workers, with Davis,[5] have made an electrophoretic analysis of pig serum, which contains five distinct proteins. Fractional precipitation with ammonium sulphate allows separation of γ- and α-globulins. The α-globulin has an electrophoretic pattern with two peaks, indicating the existence of two forms of α-globulin, and it is the α_2-globulin which is or contains hypertensinogen, since it alone acts as a substrate for the production of hypertensin. Page and Helmer[6] have already claimed the production of crystalline salts of hypertensin. Croxatto and Croxatto,[7] in Chile, have been able to purify considerably and to separate hypertensinogen and hypertensinase from ox-serum. It is evident that the isolation of the various factors in a state of chemical purity is proceeding rapidly.

OPIUM TRAFFIC IN THE FAR EAST

THE international control of drugs of addiction took its origin from the international opium conference held at the Hague in 1911–12. In the convention drafted by that conference it was (by article 6) the avowed object of the contracting powers to take measures for the gradual and effective suppression of opium-smoking by prohibiting the manufacture of and internal and external trade in "prepared opium." Those powers not yet ready to carry out this policy pledged themselves to do so as soon as possible. Twelve years later at the opium conferences at Geneva the delay in effectuating the provisions in regard to opium-smoking occasioned stormy debates, almost resulting in an impasse. A protocol was signed, with the abstention of China, postponing any further measures, in accordance with article 6 of the Hague Convention, to a period of not more than 15 years from the date when a commission shall have decided that the export of raw opium from producing countries no longer constitutes an obstacle to a reduction in the use of prepared opium. The representatives of the USA and China withdrew from the second Geneva conference partly on the ground of failure to prohibit or restrict the use of "prepared opium" and also because of the failure to limit the production of opium (and coca) to medical and scientific needs only.

A writer in the *Times* of Dec. 11 doubts both the possibility and the advisability of totally abolishing opium-smoking in the Far East. He takes the view that opium-smoking is rather more injurious than cigarette-smoking, but less so than the habitual consumption of alcohol, and argues that by forcibly depriving the Oriental of something for which his par-

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1. *J. exp. Med.* 1943, **78**, 67.
2. Munoz, J. M., Braun-Menendez, E. and Fasciolo, J. C. *Amer. J. med. Sci.* 1940, **200**, 608.
3. Edman, P., von Euler, U. S., Jorpes, E. and Sjöstrand, O. T. *J. Physiol.* 1942, **101**, 284.
4. *J. biol. Chem.* 1943, **147**, 135.
5. *Ibid*, 1943, **147**, 143.
6. *J. exp. Med.* 1940, **71**, 29.
7. *Anal. Acad. Biol. Univ. Chile*, 1940, **3**, 83

ticular constitution craves we may turn an amiable, introspective, hardworking labourer into a bellicose egoist, besides bringing back the smugglers and dope pedlars and opening up further fields for the illicit consumption of morphine and cocaine. The attitude of the Indian Government, following the Royal Commission of 1895, was to emphasise the evils of opium-smoking while justifying the prevalent Indian habit of eating opium, which the commission spoke of as the universal household remedy. But from 1912 onwards, in view of the appalling excess of production of opium and its products over any conceivable legitimate requirements, it has been evident that cultivation of the poppy and the production of raw opium must be reduced. The recent announcement in the House of Commons[8] that it has been decided to adopt the policy of total prohibition of opium-smoking in the British and British-protected territories in the Far East which are now in enemy occupation and not to restore [illegible] prepared opium therein is [illegible] ious critic might be led to [illegible] p was not taken while the territories in question were in British possession or under British protection. Indeed the British representative at the Geneva conferences had in his report called attention to the fact "that a very considerable proportion of the revenue of certain of the Crown Colonies is drawn from the traffic in opium for smoking, which is a criminal offence in the self-governing parts of the British Empire and which His Majesty's Government is internally bound to suppress." The reply of the Colonial Secretary also referred to steps to be taken to limit and control the production of opium and promised that the Government will consult with the governments of other countries concerned with a view to securing their effective coöperation in the solution of this problem. This too should gratify America. At last it seems that the fundamental prerequisite for the efficient restriction of opium and its derivatives to legitimate medical and scientific purposes is recognised to be the limitation of opium production.

OTHER PEOPLE'S THUNDER ON THE LEFT

THE Communist Party has produced a memorandum on a national medical service[9] submitted to the late Minister of Health last August. One may hope Mr. Brown studied it carefully, for, while it contains little new, it has picked out from other plans much that is good. Indeed it is a strangely moderate document: with Left and Right rapidly approaching each other, the centre of the road may soon be uncomfortably crowded. The Communists want a whole-time service, but are prepared [illegible] major authorities [illegible] constituent local [illegible] bodies only, pending the creation of multi-purpose directly-elected regional authorities. Health workers come on to the boards as non-voting members. Each board has a regional health-office with six divisions—environmental medicine, epidemiological services, hospitals, health centres, mental health services, and industrial medicine. The present local authorities retain their medical officers of health, but their public health departments are stripped of all clinical functions, though they would still coöperate in epidemiological control. Health centres and divisional health centres (the medical centres or local hospitals of Medical Planning Research) are on familiar lines. An original suggestion is that the first step towards periodical health examinations should be the examination of adolescents before they start work for the first time. It is recognised that much industrial medicine should be done by general practitioners working part-time; so it is suggested that every student should have some training in industrial medicine, while postgraduate facilities should also be widely available. No radical variations from Medical Planning Research proposals are made with regard to hospitals. At the centre there is still the Ministry of Health, balanced on either side by a Central Medical Board to look after wages, appointments, and conditions of service, and an elected Medical Advisory Committee.

CLINICAL TRIALS OF SULPHAMERAZINE

SULPHAMERAZINE, a monomethyl derivative of sulphadiazine whose pharmacology has already been discussed in these columns,[1] is absorbed readily from the alimentary canal but excreted slowly, so that an exceptionally high and persistent blood concentration can be maintained with moderate and fairly infrequent doses, its chief clinical advantage. On a basis of equal blood concentrations, its therapeutic activity and toxicity are closely similar to those of sulphadiazine. The solubilities of sulphamerazine and of its acetyl derivative are greater than those of sulphadiazine and of acetyl sulphadiazine, so that the risk of blockage of the urinary channels ought to be less than with sulphadiazine. Its therapeutic action in cerebrospinal fever and pneumonia has now been studied by Gefter, Flippin and their collaborators[2] in Philadelphia. They treated 45 patients with cerebrospinal fever, 36 of whom were adolescents or adults. An initial dose of 3 g. of sodium sulphamerazine was given intravenously and then 1 g. was given by mouth every four hours until the clinical symptoms had disappeared; the average total dosage was 56 g. during 9·5 days. With children smaller doses were used. The average plasma concentration of sulphamerazine was about 13–16 mg. per 100 c.cm.; but since the compound is unevenly distributed between plasma and red cells, this figure cannot be directly compared with figures for blood concentrations of the other sulphonamides. There were only 3 deaths, giving a case-fatality of 6·7%, 2 of the patients being almost moribund when treatment was started. The case-fatality for cerebrospinal fever in Philadelphia during 1936–42 was about 40–57%, and in a previous series treated with sulphadiazine it was 12·5%. But the fatality varies so much from one epidemic to another that too close a comparison cannot be made between these different figures. With this high dosage toxic symptoms were not uncommon—they occurred in 11 of the 45 patients; 6 had skin rashes, 4 drug fever, and 1 acute loin pain and gross hæmaturia on the 14th day after taking 77 g. of the compound. This last case demonstrates that sulphamerazine may cause blockage of the urinary passages, in the same way as the other sulphonamide compounds do, even though (as in this series) a large fluid intake is maintained. Another report on the use of sulphamerazine in the treatment of meningococcal meningitis is given by Lepper, Sweet and Dowling,[3] who treated 22 cases with sulphamerazine, and 22 alternate cases with sulphadiazine. The dose employed was somewhat higher than that used by Gefter and his colleagues. The therapeutic action of the two compounds was practically identical (case-mortality 9·1% in each series) and so was the toxicity. Three of the 22 patients on sulphamerazine had renal complications, and one of them required cystoscopy.

In a lobar pneumonia series reported by Flippin, Gefter and their colleagues 80 patients were treated with sulphamerazine and 80 with sulphadiazine, alternate patients being assigned to either compound as they were admitted. For this infection the dosage was lower, an initial dose of 3 g. being given by mouth (or by intravenous injection in severe cases) and then 1 g. every six or eight hours until clinical improvement was established; the average total dose of sulphamerazine was 23 g. during six days. With sulphadiazine an initial dose of 3 g. was given by mouth and then 1 g. four-hourly, the average total dose being 31 g. spread over seven days. The average plasma concentration of sulphamerazine was about 11–13 mg. per 100 c.cm., while that of sulphadiazine was 8 mg. per 100 c.cm. Apart from a slightly quicker defervescence among the patients treated with sulphamerazine, the clinical results of the two treatments were practically indistinguishable both as regards therapeutic efficiency and freedom from toxic reactions. Six of the patients on sulphamerazine and 8 of the 80 on sulphadiazine died. Toxic reactions were negligible, 4 out of the 160 patients having transient vomiting, 7 microscopic hæmaturia and 3 drug fever.

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[8] See *Lancet*, Nov. 20, 1943, p. 651.

[9] Central Books Ltd., 2, Parton St., London, W.C.1. 1s.

[1] *Lancet* [illegible] Welch, A. D., [illegible] A. R., [illegible] 77, 337.

[2] Ge[illegible] H. F. [illegible] Gefter, [illegible]

[3] Le[illegible] *et al.* [illegible] *Ass.* 1943, 123, 134.

Similar experience is reported by Hall and Spink[4] who used sulphamerazine in the treatment of 116 miscellaneous infections. They found its therapeutic activity and toxicity to be similar to that of sulphadiazine, a lower dosage being required to produce the same result. It was less toxic than sulphanilamide, sulphapyridine or sulphathiazole, but sulphathiazole appeared to be more effective in the treatment of staphylococcal infections. In spite of its solubility being greater than that of sulphadiazine, sulphamerazine caused symptoms of urinary blockage in 2 of these 116 cases. One of the cases required ureteral catheterisation; the trouble in this case may have been brought on by a high acidity of the urine, owing to the administration of ammonium chloride. Hall and Spink recommend that all patients should be given enough fluid to maintain a large flow of urine and enough sodium bicarbonate to make the urine alkaline. Another series comprising 103 patients with miscellaneous infections has been recorded by Hageman and others,[5] whose therapeutic results with sulphamerazine compared favourably with those obtained with sulphadiazine and a lower dosage was adequate to maintain comparable blood levels; 3 of the 103 patients had gross hæmaturia. Altogether sulphamerazine seems much the same as sulphadiazine in practice, but it may be somewhat more economical and more convenient to administer.

PROTEIN REPLACEMENT AFTER BURNS

Success in the treatment of burn shock seems to depend chiefly on early and adequate replacement of lost plasma proteins, and subsequent maintenance of a normal plasma-protein level. Speed in the treatment of burnt people is partly an administrative problem, which can best be solved by coördination of the ambulance service with appropriate hospital facilities. At all hospitals materials and staff for immediate intravenous infusions must be constantly available and the staff should be warned in advance that the patient is coming. For the replacement of plasma proteins no real substitute for plasma has so far been found. Parkins and his associates[6] have lately compared the effect of gelatin solution with plasma in dogs subjected to standardised severe burns, and found that, though hæmoconcentration was as well controlled with gelatin as with plasma, the plasma-infused dogs survived much longer. They believe that some factor may be found in plasma which, when added to gelatin, may make it as effective as plasma in maintaining blood-pressure and thus saving life. However this may be, the present need is that every hospital which may have to treat burns should keep a sufficient supply of plasma; and as the intervals between cases of severe burns are apt to be long, it is generally convenient that this plasma should be in the dried form which keeps indefinitely. Dried serum serves the same purpose.

To maintain the plasma protein at a normal level over long periods of recovery is less easy than it appears. A detailed study of nitrogen metabolism following burns by Taylor et al.[7] showed that, to bring the plasma-protein percentage to normal and thus relieve œdema in the later stages of the treatment of burns, some patients needed supplementary feeding by stomach-tube and veins up to a daily protein intake of 500 grammes. In one case, during seven weeks a positive nitrogen balance equivalent to 6000 g. of protein was required to raise the plasma-protein level to normal and relieve œdema; in this case no impairment of liver function was noted. It is clear that more work is wanted along these lines, and if all hospitals cannot be equipped for protein estimations it looks as though all severely burnt patients should be evacuated to those that can undertake them.

INDUSTRIAL HEALTH EXPLAINED

The Industrial Health Research Board has carried out much fundamental research and has published many detailed reports on the factors that promote or prevent efficiency in the worker. The board's findings, however, have not been applied in practice as quickly as they might have been, and some critics have maintained that the reports, which are presumably designed to be read by directors and works managers, have been written too much in the phraseology of the statistician and the physiologist. A busy works manager, they point out, is unlikely to be moved by the niceties of a correlation coefficient. Evidently the Board has taken this reproach to heart, for it has now issued the first of a new series of pamphlets[8] giving in non-technical form the main facts discovered by their investigators. This pamphlet has two sections, the first on "ventilation and heating" and the second on "lighting and seeing." It will be followed by others; indeed it is proposed that in future the results of any important new research in industrial health shall be published both as a comprehensive scientific report and also more briefly in everyday language. The authors of the first pamphlet have made a careful selection of the important facts about ventilation, heating, lighting and vision, and include some excellent photographs. One picture shows a blacked-out foundry with artificial "windows" fitted in the roof by putting fluorescent tubular lamps behind window panes; these "windows" are said to have desirable psychological effects on the workers and they are recommended for wider adoption in war-time factories. Other photographs show examples of good and bad lighting of factory workrooms and also methods of natural and mechanical ventilation.

Wing-Commander Kenneth Robson will deliver the Goulstonian lectures at the Royal College of Physicians of London on Thursday, Jan. 13, Tuesday, Jan. 18, and Thursday, Jan. 20, at 2.30 PM. His subject is to be primary pleurisy with effusion.

In recognition of their work on penicillin Prof. Alexander Fleming, FRS, and Prof. H. W. Florey, FRS, have jointly received an award from the American Pharmaceutical Manufacturers' Association for contributing most to the advancement of medicine in 1943. Last Monday night, in a broadcast from Washington, Major-General Kirk, surgeon-general of the United States Army, expressed his congratulations, and Professor Fleming, as discoverer of penicillin, replied. Thanks to much work on both sides of the Atlantic, he said, his baby penicillin was growing up with phenomenal rapidity. He foresaw a time when infections now untouched would be conquered by more powerful new derivatives.

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[4] Hall, W. H. and Spink, W. W. *Ibid*, p. 125.

[5] Hageman, P. O., Harford, C. G., Sobin, S. S. and Ahrens, R. E. *Ibid*, p. 325.

[6] Parkins, W. M., Koop, C. E., Riegel, C., Vars, H. M. and Lockwood, J. S. *Ann. Surg.* 1943, 118, 193.

[7] Taylor, F. H. L., Levenson, S. M., Davidson, C. S., Browder, N. C. and Lund, C. C. *Ibid*, p. 215.

[8] Conditions for Industrial Health and Efficiency. Issued by Industrial Health Research Board of the Medical Research Council. Pamphlet No. 1. HM Stationery Office, 1943, *3d.*

Special Article.

SOCIAL INSURANCE AND NEUROTIC DISORDER

RECOMMENDATIONS OF RMPA

Sir William Beveridge's proposals on social insurance bear directly on mental health in the coming years. Feeling that much will turn on the way they are implemented, the Royal Medico-Psychological Association have prepared a memorandum discussing in detail how they might be applied so as to foster a healthy mental outlook, as well as physical well-being, in our country. The substance of some of their chief recommendations is set out below, with a few words explaining how they were reached.

1. An efficient mechanism to re-establish the unemployed in industry as soon as possible would be the most important factor in alleviating the psychological distress and illness due to "want." The duration of unemployment which may be unavoidable and so, of necessity, "allowed" or "condoned" by the scheme should be less than the period after which active job-hunting leads to a phase of active psychological stress, and should never be long enough for the final apathetic "broken" stage to develop; studies should be undertaken at a suitable time to determine the usual durations of these periods in England.

That the unemployed man goes through such phases has been shown by studies already made. At the loss of his job he experiences an initial phase of shock, followed successively by periods of active job-hunting, anxiety and apathy. During the anxious phase, it seems, he is still capable of being settled in a job, and a satisfactory remedial scheme would not let him go beyond this stage without finding him work. In the final apathetic stage he becomes fatalistic, sometimes resentful, and adapts himself within a narrower field.

2. With full employment and a comprehensive medical service, the so-called unemployable without physical disability will usually be a psychiatric as well as a social problem.

Roughly speaking, the less able members of the population are the first to be affected by unemployment—those who are less intelligent, less skilled, or less ready to adjust themselves and persevere. Psychiatric disability is likely to be commoner in this group than among those who have been able to fit in with the ordinary demands of life.

4. Safeguards against malingering must not be allowed to impair the efficient working of the scheme.

Wilful counterfeiting of illness is not found to be a problem, probably because of the immense capacity of the mind to deceive itself. Schemes can therefore safe[illegible]ny rather than to c[illegible]

V[illegible] the Beveridge rep[illegible]e maintained; the memo suggests that insurance against loss of work as well as loss of income might be considered as part of the scheme. The offer of a training course after six mo[illegible]es not meet the case. A pla[illegible]f employed workers which abs[illegible] become unemployed would have a better effect on mental well-being. Labour could be drawn from this pool as it was needed. The choice of work on leaving the pool should initially be made by the applicant after he has been advised on the occupations available, and been told what they entail—that is, he would have some simple vocational guidance. Unpleasant work should carry compensatory advantages. Those falling out of employment should be examined to find out the cause, and the information so collected should be analysed.

6. A flat benefit rate is a sound principle, but also requires, if it is to further mental health, a minimum wage standard, provision to cover rent adequately, and no exception such as that suggested for injured workers (i.e. those not permanently disabled), and for the aged during the transitional period of 20 years.

Fear of not being able to pay the rent is a cause of anxiety and neurosis, and should be eliminated either by full means to cover it, or by some equalisation of rents. In dealing with the injured man the memo suggests that we should only consider how badly he has been hurt and what can be done for him, without linking these things to the question of who is to carry the responsibility. For accidents due to employer's negligence an injured person can recover damages at common law. On psychiatric grounds the memo suggests that, the damages which can be collected for any such temporary disability should be restricted, so that the prolongation of temporary illness cannot bring financial advantage to the sufferer. Thus the defendant's responsibility would be mainly for treatment and rehabilitation rather than for compensation.

7. Earnings extra to the benefits should be permitted, with medical approval and supervision, for any only partly disabled, in order to encourage the most effective rehabilitation—suitable adjusted work.

In the interests of both patient and nation any man who can work without harm to his disability (even though entitled to benefits) should be encouraged to do so. Workers should therefore be allowed to keep what they earn, and social security payment should not be reduced, the RMPA consider, until the total receipts exceed (say) 66–90% of the usual earnings. There would thus be a clear advantage in taking work. For the same reason training benefit should be at a higher rate than flat disability or unemployment benefit.

Subjects who, "through weakness or badness of character," fail to comply with the conditions for insurance benefit will pass to the care of the National Assistance Board. Such cases, the RMPA feel, may reasonably be dealt with on the basis of a means test: but it is unlikely that different financial treatment will cure the character defect. The memo suggests that psychiatry can help here.

8. War service disabilities should be dealt with as a special variety of industrial injury.

This would avoid disputes about whether the disability was really due to war. Any disability occurring in employment involving war risk (e.g. in the armed forces) or arising out of war risk, whatever the employment at the time, should qualify people for this benefit.

9. Old age should be dealt with as a disability (either partial or [illegible] age reached, unless there is [illegible]e, and payments, unless bas[illegible], should be uninfluenced by continuance at work.

The memo points out that there is no justification other than an actuarial one for treating the elderly differently from those of working age. The claims of the *aged are comparable to those of the partially or totally* permanently disabled, and they should be entitled to a pension equivalent to loss of earning power. Retirement should not be the condition required before payments can begin.

11. Care of injured workers under the proposed scheme should lessen the tendency to neurosis. Abolition of lump-sum payments and concentration on the provision of adequate medical care and social rehabilitation are desirable for the same reason. Much that is at present dealt with by litigation should be referred to medical tribunals.

Many psychoneurotic states are caused or aggravated by the Workmen's Compensation Act. The prospects of a lump sum may lead a man to prolong an incapaci and disturb his social life, while failure to receive wh he expected may leave him bitter, and his anxie [illegible]roposal [illegible] the stat[illegible] abolishe would, the memo suggests, permit of the same disturbin situation in a modified form.

If neuroses are to be avoided compensation mus begin at the time of the accident; furthermore occup tion counteracts preoccupation. Each case, the mem suggests, should be under the care of a social worke who will act as a link between patient, hospital an employer. Emphasis should be on the physical enviror ment, which should be made safe, rather than on minor signs of disease in the workers. Oft-repeated medical examinations are alarming and favour hypochondriasis.

12. The details of administration, whatever scheme is adopted, should be so devised that their psychological effects on the individual will be favourable.

The memo recalls that much of the stigma attaching to the Poor Law in the last century derived from the atmosphere, and the buildings, in which it was administered. The labour exchange should not only do the work, but have the aspect, of a human self-respecting and respected public service. Men should not be provoked by often-repeated questions or discouraged by unnecessary delays. And both doctor and patient deserve some alleviating measures over the question of certificates.

13. There should be a committee which . . . will concern itself with all persons receiving benefit longer than a stated period. Psychiatry should be represented on this advisory committee.

Some patients may seem to be unemployable, and some may develop what is called in the memo, for convenience, "benefit neurosis." Those in the first group will be mainly cases of mental deficiency and psychopathic personality and must be allowed for; and every possible effort must be made to prevent cases of the second type developing. The next two recommendations suggest how.

14. Any individual who has been receiving benefit longer than the stated period should have his case referred to an officer, with specialised social training, who will have medical advice at his or her disposal; and whose business it will be to decide whether the worker should be examined by a psychiatrist. There should be arrangements for the psychiatrist to review persons with a persistent illness whenever there is doubt whether this illness is sufficient physical cause for their disability.

15. The scheme envisages various methods—e.g., placement by employment exchanges, re-training and rehabilitation, for facilitating re-entry into employment—and these will need coördination. The normal method of re-entry via the employment exchange should entail some form of vocational guidance, and a social worker should coordinate this with the other methods mentioned, since the whole procedure involves watching what is medically advisable to what is available.

Psychopaths and defectives, it is felt, could not be dealt with adequately at the training centres without spoiling the atmosphere; and the memo suggests that a rehabilitation centre might be set up to deal with the more difficult "fit unemployables."

LENGTH OF GESTATION

SEARCHING the literature diligently Dr. Kenneth has found some 350 references to gestation periods in animals varying, alphabetically, from the agouti to the zebra. The results of these labours have been issued by the Imperial Bureau of Animal Breeding and Genetics and form a useful book of reference.[1] The information given comprises the average period recorded for different species by different workers, and, when available, the minimum and maximum times that have been noted. When the "average" is based upon a single observation Kenneth draws attention to the fact, but beyond this he passes no comment upon the worth or scale of the data. Circumstances, he says, prevented such inclusions. Even for the domestic cat, for instance, the average times given by different observers vary by as much as 20% (from 52 to 63 days) and one would need to consult the original data to find reasons for such discrepancies. Kenneth makes it easy to do so, but it would have been an advantage to have had the number of observations contributing to the figures and thus some scale of relative values for them. For a description of the variability round the average the standard deviation would also have been useful but this was presumably lacking in the original papers.

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[1] Gestation Periods, a table and bibliography. J. H. Kenneth, MA, PH D. Oliver and Boyd. Pp. 23. 2s.

Messrs. CALTOS Ltd., 15, Kingsway, London, W.C.2, have a limited number of pocket diaries (1944) which they offer to doctors who send 1*d.* stamp.

In England Now

A Running Commentary by Peripatetic Correspondents

I ESTIMATE that there were forty head in the waiting-room. With my partner and dispenser both down with 'flu I had to get on with it. "First one, please," I shouted. It was Mrs. Blight, multiloquent, menopausal and melancholy, wanting one of her periodic long chats about her blood-pressure. I steeled myself to listen. The telephone rang. Would the doctor please to call to Frogmire to see maister, missis and three children all to bade? I hung up and turned to Mrs. Blight. "You were saying——?" The telephone rang. Would the doctor come at once to Withywind (five miles in the opposite direction) to see granfer who was took turrible tight on his chest? I replaced the receiver. Some of the coughs in the waiting-room sounded ominously like growls. "I'm sorry, Mrs. Blight, you were just saying——?" The telephone rang. Would the doctor . . . Eight times did I try to hear Mrs. Blight's old old story and eight times were we interrupted by that dreadful bell. At the ninth ring I smiled a rueful smile. "We don't seem to be getting on very fast, do we, Mrs. Blight?" There was a certain forced brightness in my tone. "Perhaps you'd like to wait a few days till things are a little easier." (A fond and pious hope.) Mrs. Blight rose reluctantly more in sorrow than in anger, and then, as one conceding graciously and much, "Very well, doctor." she said. To the accompaniment of the tenth ring I bowed her out.

* * *

In spite of several long spells of wool-gathering, I got the impression that the lecturer was definitely in favour of efficiency. Not for the first time I felt grave misgivings in all directions. Finding myself opposite him at tea, I plucked up courage, "Sir," I said, "This business of efficiency—how can it be acquired? *Can* one acquire it? or is one just born with it or without it, like red hair?" He laughed teethfully. "No, I should say it is an acquired characteristic. You can't blame your chromosomes. It's an acquired characteristic which can be developed by practice." "I'm not blaming anything, Sir," I replied patiently. "You see, I'm not sure I admire or envy the efficient person any more or less than I admire or envy the chap with red hair. My point is this. Obviously some people have got it and others haven't. If it's a question of development, then some people can develop it more easily than others can, like a facility for ball-games. It must be inherent in their pattern." "Ye-ss. I suppose that may be so." ". . . and so, Sir, must a total lack of it in others?" "Oh come now, I can't imagine anyone being totally inefficient!" "Can't you really, Sir?" I said, "Well *I* can. In fact, I myself am totally inefficient and always have been. No, please don't apologise or anything. My earliest memories are of being chided for it by parents and siblings; only it was called Irresponsibility in those days. Masters at school beat me up for it as a dreary sort of routine. It was preached at me hard throughout my tender formative years without the slightest effect, except of course to make me feel inferior. But I managed to get over that in time."

The man was obviously interested. He proffered his cigarette case. My lighter worked at the first attempt. I gazed at it with genuine astonishment. "That does happen sometimes, Sir," I explained apologetically, "but not often. Usually the trains I look up turn out to run on Saturdays Only; I find unposted letters in my pockets weeks afterwards; I can never remember people's names or telephone numbers; my best salutes come off when I'm not wearing a cap. It's transmissible too, you know, Sir. My boy is just the same; he's known as Dopey in his Scouts. And yet we manage to get along all right, have lots of fun. Life is one series of glorious unexpected adventures. And now after years and years of inefficiency I am told I must acquire efficiency. You know, Sir, I'm a bit frightened, because I'm afraid it can't be done."

He became very kind and encouraging. "Aren't you being too modest?" he asked. "Modest? Not a bit of it, Sir. There are other qualities besides efficiency, don't forget. Goodness is one; piety is another—*San Luis Rey*, you know—and, I would add beauty, too.

I don't mean mere physical beauty. I'm sure one can have a beautiful nature without being efficient. Just because I am deficient in one particular quality, and one which I have long since debunked to my own satisfaction, doesn't bother *me*. I might just as well weep because I haven't got red hair. I can take it. But it looks as if the Army won't be able to. What do you think, Sir?" "What did you do in Civvy Street?" he asked, anxious to make a diagnosis of some sort. I told him. "Oh come. I can't imagine that you are so very inefficient if you can run a show like that. It's inconceivable." "I'm not so sure that I did run it, Sir," I said, "I rather think it ran me. I had clerks and secretaries and things to look up my trains and see about letters being posted and all that. Expensive? I know; but nothing like so expensive as if I tried to do that sort of thing myself. My own work was purely clinical. . . . But let's get back to efficiency in the Army. Is it any use [illegible] could do that [illegible] black?" He [illegible] at he was going [illegible] 'I should say it's no good pretending to be anything you aren't. You'd get found out very quickly. But I do think a —er—conscious lack of efficiency can be concealed. A man who displays keenness in his job and interest in his men can't fail to get on." A brace of contradictions and a non-sequitur seemed to brighten him up no end, and he proceeded apace, "I always maintain that a man who always tries his damnedest and puts up the best show he's capable of . . ."

But he was becoming lyrical just like he was in his lecture; and I suddenly remembered something else. "But, Sir," I cut in as soon as it was decent, "Let's take that business of getting to know the men, and asking them about their wives and children, and wanting to see their photographs—is that really necessary? I mean, need I do it?" "Of course there is no necessity, my dear man," he replied, "but you will if you're wise. You'll find it a damned useful tip I can assure you from personal experience." "Well Sir, you really do surprise me," I said. "My own feeling is that it would be an impertinence. I'd never dream of going into all those matters unasked even with my closest friends. They may have seven wives and four hundred children apiece for all it concerns me. And I know I personally should feel pretty snooty if anyone of any rank whatsoever started interrogating me on my private life. In fact I can imagine a unit—of chaps of my persuasion—getting utterly exhausted and going on strike because of these tender inquiries. Can't you imagine our back-stage conversation in the barrack-rooms? 'New subaltern arrived in camp tonight, chaps. Parade tomorrow with family photographs at the trail'?" "No, I can't," he snapped, and I couldn't help wondering whether something had gone wrong with his sense of humour. (Moreover, what the Bellman said three times was true, I reflected.) "I wonder," I mused aloud, "about this business of imagination. Is it acquired? *Can* one acquire it? Or is one just born. . . ."

But he had left the table. All my misgivings returned. I was not being a success. He wouldn't remember because he was in his pram at the time, but the one thing which the last war proved conclusively was that I should never make an efficient soldier. I ought to have told him that. I resumed my woolgathering, and forgot all about the evening PT parade until it was too late. I learned afterwards that when my name was called three colleagues answered, "Here, Sir," and one gabbled "Excused-PT-doctor's-orders"; which wasn't so very efficient either.

* * *

My job is definitely a Good Thing, but it has Some Bad Features, chief among which is that it involves getting up at about 6.30 AM. For years I have not seen the sun rise because I went to work too late. Now I don't see it because I go too early. The other day we started late (at 9.15) and I did see the sun rise and was most impressed by the forgotten phenomenon. The workers at the factory start at 7 AM and finish at 6 PM, so *we* can't complain. The assembly shop is a most impressive sight, with all the aircraft facing up to the far door, through which they will go when finished. It is an enormous shop, with I don't know how many planes in it (and of course I wouldn't say if I did), their tails and fuselages separate at first, and both skeletons, then getting clad in their outer coverings, then joined together, and so on through all the final stages until at the far door they are complete and ready to take the air at the flight-shed just across the road. A macabre lot the human beings: they have yellow skin and purple lips, with any facial veins showing up as purple, owing to the mercury-vapour lighting. Incidentally I doubt very much whether this is a good form of lighting for factories, since—at any rate here—there is a good deal of glare.

Parliament

ON THE FLOOR OF THE HOUSE

MEDICUS MP

THE debate on the Labour amendment to the address showed a House prepared to be conciliatory and constructive and yet ready to be critical of the lack of definition in Government proposals for dealing with the strategy of peace. Now that the Government have declared that the time has now come for definite proposals for postwar legislation to be put forward, the House wishes to see these proposals as soon as possible in the form of bills for discussion. Since the declaration of peace prospects, as one may say, there have been three stages in the Government's presentation of their views. Stage one is the general adumbration of an idea, of which Assumption B in the Beveridge report that we need a comprehensive and unified medical service is an example. The second stage is the white-paper which serves as a basis for Parliamentary discussion. The third stage is a bill embodying specific proposals. In general, apart from education, the House has not yet reached the white-paper stage. The white-paper on the medical services is still delayed to some time "early next year" and any prospect of a bill is in the indeterminate future, but the Education Bill is to appear before these notes reach my readers.

[illegible]

on the practical application of rehabilitation on a large scale. The Minister's speech stressed the psychological and sociological aspect of rehabilitation. To contact a man in hospital shortly after an accident and let him know that someone is interested in his recovery, waiting to help him and ready to train him may do more than anything else in making the skill of the surgeon effective. The first clause of the bill is comprehensive. It defines a disabled person as one "who, on account of injury, disease, or congenital deformity, is substantially handicapped in obtaining or keeping employment or in undertaking work on his own account." This includes not only the victims of war or accidental injury, but those handicapped by such disabilities as blindness or tuberculosis. The [illegible] with approval and the bill [illegible] tuberculosis hospital to ac[illegible] post-treatment training. Rehabilitation after accident or injuries has been widely extended during the war. Once established as a generally recognised method of treatment it is not likely that we shall allow it to lapse. The Minister spoke as though rehabilitation was a discovery of his department but it is in fact the application of medical and surgical knowledge over a wider field than has hitherto been possible because of the lack of hospital facilities and the necessary organisation.

In the debate on reconstruction problems in the House of Lords Lord Woolton confined himself to a cautious general review and he said nothing about a medical service. Lord Horder assured his listeners that the medical profession were anxious to help on Assumption B but said he thought we should begin with the machine and not the man who drives it. In the voluntary hospitals we have "a large body of highly efficient well-administered institutes." Teamwork is based [illegible] hospitals and modern medicine is teamwork. T[illegible] machine should be improved by regi[illegible] Lord Horder's scheme was: regional [illegible] up centres to deal with positive healt[illegible] the NHI to include dependants. This would be better than making the doctor a civil servant. Parliamentary opinion would probably be that this scheme was not comprehensive, for it does not deal with the public-health services, with those of the education authorities or with industrial medicine. There are indeed many fields to be covered, and as the white-paper stage of medical reorganisation is postponed to next year will it be possible to introduce and pass a bill commanding general consent? The probabilities point to a temporary compromise.

FROM THE PRESS GALLERY

Back at Scratch

IN the House of Lords on the second day of the debate on reconstruction Lord HORDER (speaking as one of Lord Woolton's advisers at the Ministry of Food during the last four years) said he was sure the Minister of Reconstruction could face possible disasters in the economic field with as much success as he had done in the field of the country's nutrition. It might be appropriate, Lord Horder continued, to remind the Government at this moment that they were back at scratch in the matter of the health services. A white-paper had been promised, and it would be encouraging if they could be told that it would be forthcoming soon. He understood from Lord Woolton's speech that they had to look primarily in the matter of health services to the Ministry of Health, and in the name of the medical profession he welcomed Mr. Willink as the new minister. Though he spoke for no official body Lord Horder felt certain that, as a profession, doctors were anxious to help in implementing Assumption B, which had already received in principle the Government's support. He was a little surprised and disappointed when he learned that the new Minister of Reconstruction would not initiate policy. He would like to feel that at least Lord Woolton was free to suggest policy, and would keep a watchful eye on the negotiations between the Government representatives and the bodies representing the profession and the voluntary hospitals. (Lord WOOLTON interposed that what he had said was that the *primary* responsibility rested with the departments for formulating plans, and he was certainly free to suggest policy.)

Lord Horder expressed his satisfaction that there would be conference and suggestion (he would not use the word guidance) in regard to the reorganisation of the medical services; consideration as to how the conversations should take place, how the stage should be set, and possibly beginning not with the doctors—not marching the doctors up the hill and marching them down again, and then pausing as if to say, "I have made a beginning in reorganising the health services." Lord Horder thought that to begin with the machine rather than with the man who drove the machine might next time be more fruitful of results. As regards the machine they had in the voluntary hospitals a body of efficient, well-administered institutions. Modern medicine was teamwork, and teamwork was based on hospitals not on individuals. Therefore until there was proper linking, extending from the domiciliary medical service up to and including the big teaching and research centre based on a university, a large part of the doctor's time, especially the country doctor's time, would be absorbed in making the necessary contact to get what his patient required. Until the machine was improved by regionalising the hospitals, the body of skill and knowledge in medicine would not be available to the citizens. Doctors had been pressing for years that the dependants of the workers should be included in the national insurance scheme. He thought it had been worked out actuarily to mean something like £9–10 million a year. The worker's anxiety because he had no feeling of security as to the treatment of his dependants would be relieved at once if the same facilities were given to the dependants as to the workers. Health centres, preventive medicine, positive health—that was becoming a cliché, but they were doing nothing about it. It would not be difficult to duplicate and triplicate—in fact to do one hundred times over—what was done at Peckham ten years ago with great success. Peckham, the pioneer health centre, had unfortunately gone into cold storage, but this should not be a parochial effort, it should be a national effort. Regional hospitals, setting up centres for dealing with positive health, expanding the national insurance scheme to include the dependants through larger contributions—by these means the reorganisation of the medical services could be obtained more satisfactorily and quickly and with less bitterness of heart than by saying to the doctor, "We wish you to be a civil servant." He did not think it was in the public interest to convert the medical profession into a civil service, and he thought by now the public shared that feeling. But if they were going to hand over the hospitals to local authorities, and hand over the doctors as well, ought not something to be done to prepare the local authorities for exercising those new powers? He had already reminded their lordships of the efficiency of the large voluntary hospitals. Was it to be wondered at that quite early in one of the conversations—so he was given to understand—there was a feeling that a proper spirit of partnership was not being exercised between the representatives of the local authorities and of the voluntary hospitals, and so the conversations broke down? Now they were back at scratch, and a great opportunity was offered to the new Minister of Health, backed by the sympathetic support, suggestions and even guidance of Lord Woolton.

The White Paper

In the House of Commons on Dec. 7 replying to criticisms in regard to the length of time which the Government were taking in making public their policy in regard to the Beveridge report, Sir WILLIAM JOWITT, Minister without Portfolio, reminded the House that Beveridge took 18 months to prepare his scheme. He had the benefit of a lot of highly skilled civil servants assisting him, but he had the great advantage of not having to get their agreement in drafting his report. He made three assumptions—full employment, children's allowances and a comprehensive medical service. Did the House say that the Government, just because Beveridge was a very eminent person who knew a great deal about the subject, should accept his report with the remark, "Sir William Beveridge says so; therefore it must be all right"? Nobody would say that, and so the Government thought it right to examine his conclusions. In their investigation sometimes they came to the conclusion that Beveridge was right, and they had spent a good deal of time in proving that he was right. But they had to fill in the details and *they* were not able to make assumptions. For instance, they had to turn the phrase "comprehensive medical service" into a reality. He regretted the delay in the issue of the promised white-paper, but he hoped that early in the New Year they would be able to produce it. The House would see that they had covered a vast field of work. In many cases they had confirmed Beveridge's conclusions; but they had not slavishly copied them; in many cases they had, in fact, reached their own conclusions, and they thought they were better. But he begged those who had been talking glibly about the Government having murdered the report, or buried or mummified it, or who had been saying that the Government scheme was a thing of shreds and patches, to wait for the white-paper, because all these allegations were simply not true.

Replying to questions, Sir W. Jowitt said that there would be two or more white-papers—certainly one on the comprehensive medical service and possibly one on a workmen's compensation.

Rehabilitation and Resettlement

In the House of Commons on Dec. 10 Mr. G. TOMLINSON, parliamentary secretary to the Ministry of Labour, in moving the second reading of the Disabled Persons (Employment) Bill, said the object of rehabilitation was to fit a person for employment which he could keep in normal competition with his fellows. War-time experience had proved that it was possible for all but a small minority of the disabled to find work. The bill did not provide for medical rehabilitation, which would naturally develop as part of a comprehensive medical service. The proposals fell under three heads: first, courses of industrial rehabilitation to tone up the disabled person before he returned to his former employment or took a vocational training course in a new occupation; secondly, a statutory obligation upon employers to accept a quota of disabled from a national register which would be set up; thirdly, the creation of special facilities for the minority who required sheltered conditions. The bill was intended as a permanent addition to the country's social services and was designed to cover the casualties of peace as well as war, of industry as well as the battlefield.

QUESTION TIME

Reorganisation of Health Services

[illegible]

avoidable delay.

Mr. H. McNeil: *Do I understand the Minister to inform us that he is initiating new conversations, and that he will not* proc [illegible] Mr. [illegible] the [illegible] ance [illegible] shou [illegible] coll [illegible] and most real and personal responsibility.—Mr. Graham White: *Can the Minister give us a little bit of enlightenment* as to the period of time? Will it be six months or next year?—Mr. Willink: I hope it will be quite early next year.—Mr. G. C. Hutchinson: Will this House have an opportunity of debating the white-paper after it has been published?—Mr. Willink: Yes, sir.

Major B. E. Nield asked the Secretary of State for War if he was aware of any approach having been made to members of the medical profession now serving in the Army to ascertain their views upon the question of a state medical service; and if, when the white-paper upon the subject was issued, he would facilitate arrangements whereby their views might be expressed.—Sir James Grigg replied: The answer to the first part of the question is no, and to the second part, yes.

Medical Man-power

Sir Leonard Lyle asked the Minister of Health if he was aware *that owing to the calling up of doctors engaged in* [illegible] civilians, there was increasing difficulty in [illegible] ion, especially when Government war [illegible] labour were brought into any district; [illegible] in the area, but at present relatively unoccupied, to assist in civilian work.—Mr. Willink replied: The necessity of supplying the Forces with doctors must in certain areas cause some inconvenience to the public, although every effort to mitigate this is made in selecting doctors for recruitment and arrangements are made to secure that essential medical attention will be available. The Service Ministers have always been ready to give what help they can from their medical departments and in the present epidemic they are coöperating in arrangements under which their medical officers will give as much [illegible] permit to general practi- [illegible] l, in consultation with the departments concerned, investigate the possibility of forming a pool of medical men attached to the services in any particular area in this country to ensure that the number was kept at a minimum and their time and experience fully utilised.—Mr. Willink replied: A suggestion for pooling medical officers of the Services has already been explored by the Medical Personnel (Priority) Committee. The committee recommended *that coöperation between the* medical departments of the three Services, already carried out to a considerable extent, should be developed to the highest possible degree, but they felt that complete pooling would not be practicable.

Sir Ralph Glyn asked the Minister whether he would consult the medical committees of the London general hospitals as to steps to be taken to meet the most recent requirement of doctors to join the Services, thus reducing the hospital staffs to a *proportion which did not provide civilian patients with* proper medical treatment; and, in view of the fact that there was now an average of only one doctor to every 3000 civilians, what was the proportions of doctors to men in the Services.—Mr. Willink replied: My medical officers will be prepared, as always, to consult with, and so far as possible advise, any hospital which is in special difficulty with regard to medical staff. The decision to accelerate the recruitment of a certain [illegible]

The house officers are, of course, only a proportion of the *medical staff of a hospital* and I am advised that the recruit- [illegible] as a whole.

Tuberculosis Allowances

Mr. Stephen Davies asked the Minister if he would now, in order to avoid confusion and make it more effective, extend *his scheme of allowances to tuberculosis sufferers and their* dependants so as to include non-pulmonary and chronic [illegible] less than their own. The association with the war effort which has been the justification in such cases for making repayment from Exchequer funds under emergency powers is not applicable to the other cases referred to in the question, but the fact that certain limitations must on this ground apply to such repayment from the Exchequer does not affect the power of local authorities to grant assistance within the scope of their statutory powers, and I shall be glad to consider in consultation with representatives of local authorities how the objective of ensuring adequate assistance can most effectively be secured.

Control of Voluntary Hospitals

Dr. E. Summerskill asked the Minister what measure of control he exercised over the policy of voluntary hospitals, in view of the fact that public money was now used to subsidise wages in these institutions.—Mr. Willink replied: I assume *that the question relates to the Exchequer assistance* available to hospitals in respect of additional expenditure [illegible]

committee shall in fact be observed.

University Grants Committee

Mr. T. E. Harvey asked the Chancellor of the Exchequer the nature of the changes made in the University Grants Committee and the names of the present members.—Sir J. Anderson replied: I have increased to fifteen the number of members of the committee, in order that their advice to the *Government on the important problems that lie ahead may be* based on the widest range of experience. Before the war the committee numbered ten, but had been reduced by deaths and resignations to five. Arrangements are being made to hold the first meeting of the new committee at an early date. The following is a list of the members of the committee:

Sir Walter Mobe [illegible] LITT D, Prof. W. E. [illegible] Miss Margery Fry, [illegible] D SC, FRS, MD, Mr [illegible] D LITT, Prof. P. S. [illegible] Prof. E. J. Salisbury [illegible] Tawney, LITT D, Sir [illegible]

Mr. Harvey: Do the rules still preclude members who are in the employment of universities from being members of the committee?—Sir J. Anderson: That rule has been changed.

Tuberculosis in Belgium

In answer to a question, Mr. Dingle Foot said that according to his information it was correct that 109,511 supplementary ration books were issued in Belgium in February, 1943, to persons certified to be suffering from tuberculosis.

Deaths in Greece

Replying to a further question, Mr. Foot stated that precise figures of deaths in Athens and Piraeus during October are not yet available. In the opinion of the Swedish supervisors of the relief scheme the figure of 1800 deaths resulting from starvation or undernourishment is incorrect. It is possible

Letters to the Editor

COMMON SENSE IN ANÆSTHETICS

SIR,—We agree with part of Dr. Mallinson's article in your issue of Dec. 11, but we cannot allow to pass unchallenged his almost hysterical condemnation of ether, nor some other statements which would be dangerous if the inexperienced anæsthetist were to accept them at their face value. The ether charts produced by Dr. Mallinson are striking, but whether they incriminate the administrator or the agent is open to question. At the Radcliffe Infirmary we use ether extensively in routine lists, in major thoracic surgery and for gravely shocked patients, and have had no cause to regret having done so. Records are kept and there is a member of the staff whose sole duty it is to visit each case daily until their discharge to make sure that immediate or remote postoperative sequelæ are not overlooked.

That we are not alone in our views that ether properly used is not as lethal as Mallinson suggests, is shown by the following two extracts :—

> That realist Trueta,[1] referring to the qualities required in an anæsthetic for operations performed under war conditions, writes : " *The anæsthetic which fulfils these requirements most closely is ether.*" The italics are Trueta's.
>
> Halford,[2] referring to anæsthesia of the Pearl Harbour casualties, finishes up his article with the following paragraph : " It was the consensus of all civilian surgeons concerned, that, considering all the hazards of patient, anæsthetist and anæsthetic, open drop ether still retains the primacy ! "

'Pentothal,' properly used, is an excellent drug, but Mallinson's reference to it as " almost entirely nontoxic " and his statement that its use is the safest way of avoiding the " terrible mortality " of other methods is not in accordance with the fatalities which have followed its use. Halford, writing on the use of pentothal for Pearl Harbour casualties, states : " let it be said that intravenous anæsthesia is an ideal method of euthanasia." That a misuse of any drug can have grave consequences is common knowledge and applies as much to pentothal as to any other drug ; indeed it has been aptly said : " It is fatally easy to give an overdose of pentothal."

Mallinson says that postoperative pulmonary complications are commoner after ether than after other agents. This, again, is at variance with modern views clearly expressed by Brock,[3] Marshall[4] and Bird,[5] who show that whether the patient develops a postoperative chest condition or not depends primarily on whether the abdomen is opened or not. In support of his contention Mallinson refers to Kaye's[6] figures from the Middle East, but on looking up the reference we find that what Kaye really says is " The patients . . . suffer from dust—and—tobacco pharyngobronchitis which is almost universal amongst soldiers. . . . Further, it is the abdomina and near-abdomina in, which respiratory movement is restricted by after-pain (such as herniotomy or gunshot wounds of the chest wall) in which respiratory sequelæ have developed ; limb cases, tonsillectomies and the like have thus far come off scot-free." We have not investigated Mallinson's other references.

It is profitless to compare figures for postoperative " chests " of different anæsthetists because of the varying *diligence and frequency with which these complications* are sought, and the yardstick by which they are deemed worthy of recording. Mallinson would appear to have achieved a world record if out of his 170 abdominal cases the only chest complications were two "slight bronchitis" and one " atelectasis " ; an alternative explanation is that the mesh of his net was large.

We are well aware of the virtues inherent in modern forms of local and general anæsthetics expertly exploited. In our hospital pentothal and cyclopropane are in daily use, and in abdominal cases regional anæsthesia is employed almost routinely to give the necessary relaxation. The present-day world, however, is beset by practical difficulties. Inexperienced anæsthetists now have to undertake the responsibility of anæsthetising their fellow men on board ship or in the desert where conditions are far from ideal. Mallinson's technique of combining in the one patient pentothal, spinal analgesia and nitrous oxide no doubt gives good results used by himself in ideal circumstances, but is hardly to be recommended to the novice in the pitching destroyer or in the desert tent. His achievement in dispensing with ether in any circumstances could be equalled by a similar bigoted attitude on our part claiming that any operation could be done (barring the explosion hazard) under ether only.

While we do not doubt his admirable results with his elaborate technique and apparatus, we do feel he is wrong to suggest that it is heresy for anyone to use ether. As you suggest in your leading article in the same issue (p. 737), the skill of the anæsthetist is more important than the agent used, and we hold that equally good results are obtained from most of the anæsthetic drugs in common use, provided they are expertly administered. If the experienced anæsthetist is not available it is highly desirable that the method should be a safe one, and surely no-one doubts that ether offers a greater range of safety than any other anæsthetic. It is probable that many more patients would be alive today if " modern anæsthetics," despite their excellence in the hands of those who know how to use them, had not been discovered.

R. R. MACINTOSH.
Oxford. WILLIAM W. MUSHIN.

TUBERCLE AND THE CHILD

SIR,—In your annotation of Nov. 6 under this heading (p. 577) appears the following sentence :—

> " A year ago the incidence of tuberculous meningitis had risen by a half and it may be more now ; in London the death-rate from pulmonary tuberculosis in 1941, as compared with 1938, was quadrupled in children under 4, and trebled in children between 5 and 14—the accuracy of the population figures having been carefully checked."

These figures of death *rates*, as Dr. Allen Daley and Mr. Benjamin point out (*Brit. med J.* 1942, ii, 417), depend " upon the accuracy of population estimates." Are we not on firmer ground if we take actual numbers of deaths instead of death-rates ? Published figures are as follows:—

Age-group	London *				Administrative County of Lancaster †				England and Wales ‡			
	1938	1939	1940	1941	'38	'39	'40	'41	1938	1939	1940	1941
0– 4	30	15	22	41	3	8	10	6	153	132	150	250
5–14	25	16	24	25	9	8	15	9	262	226	279	301
15 +	2535	2619	2641	2486	790	798	851	823	20867	21184	23233	23081

The source of the figures in the above table is:
* *Brit. med. J.* 1942, ii, 417.
† Supplied to Lancashire County Council by Registrar-General.
‡ Report of the Committee on Tuberculosis in War-time (MRC No. 246).

The 1942 figures for London have just been published (*Brit. med. J.* Dec. 4, p. 713). In the age-groups 0–4 and 5–14 there were 39 deaths. In 1941 66 and in 1938 55. Thus, the almost astronomical increases in the death *rates* in the annotation are based on the fact that 66 children died from pulmonary tuberculosis in London in 1941 as compared with 55 in 1938. Further comment appears superfluous.

Lancashire County Offices, Preston. G. LISSANT COX, Central Tuberculosis Officer.

THE COMMON COLD

SIR,—The most effective method I have found of aborting colds is, directly the well-known unpleasant feeling of an incipient cold comes along, to take about a teaspoonful of saline or a weak antiseptic into the mouth, tilt the head back as far as convenient and let this liquid run as far down the throat as possible without swallowing ; then, while still holding the head back, cough violently. This causes a sort of explosion in the throat which throws the solution over the surface of the throat generally, and also—which is apparently more important—over the internal surface of the nasal cavity. The dispersed liquid apparently dilutes any mucus lying on that

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1. Trueta, J. Principles and Practice of War Surgery, London' 1943, p. 140.
2. Halford, F. J. *Anesthesiology*, 1943, 1, 69.
3. Brock, R. C., *Guy's Hosp. Rep.* 1936, 86, 1.
4. Marshall, G. and Foster-Carter, A. F. *Practitioner*, 1943, 150, 71.
5. Bird, H. M., Kilner, S. D. and Martin, D. J. *Brit. med. J.* 1943, 1, 754.
6. Kaye, G. *Anesth. & Analges.* 1941, 20, 238.

surface, for a considerable quantity may be blown out into a handkerchief although this was impossible before. Repeat this process every two hours. I find that it aborts a cold completely within a day or a day and a half, whereas otherwise it would have lasted a week or more. I call it the "explosive gargle" and I have found it far more effective than ordinary gargling or any form of nasal spray. I understand that nasal sprays are to be used for the administration of patulin, so perhaps this idea may be useful.

Spalding, Lincs. E. PICKWORTH FARROW.

THE NURSE IN CHARGE

SIR,—Your leading article mentions one of the difficulties in the medical treatment of the junior nurse. Most adults, when they feel the need of advice, can go direct to a doctor. Surely the nurse should be able to do the same, without the intervention of the nurse in charge and the home sister? When the probationer reaches the doctor she may be shy of discussing her affairs before a sister and, as you say, in the absence of a spectacular rise in temperature, she may feel that she is considered to be making an unnecessary fuss. In such an atmosphere it is difficult for the doctor to do his best for the patient.

I believe the junior nurse would be more likely to seek early treatment and to benefit by it, if her contact with the doctor were direct. If she wished, she should be able to take a friend with her and the family doctor relationship should be established as nearly as possible.

Oxford. VICTORIA SMALLPEICE.

THE NURSE'S PAY

SIR,—The scales published in the second Rushcliffe report have received the approval of the general press and the nursing profession will welcome them as a whole, but there are inconsistencies, particularly in regard to the salaries of ward sisters and women staff nurses. As your annotation of Dec. 11 (p. 740) points out, discrimination in favour of men is very marked, and as before the ward sister comes off poorly. Under the London County Council, the male student nurse, when he becomes state-registered, gets a higher salary in his fourth year of training than the ward sister in her first year, and the staff nurse in her tenth year in that grade (i.e., after fifteen years of service). In the same way, the male charge nurse, who corresponds to the ward sister begins under the LCC at a salary of £300 6*s.* a year, while the ward sister's maximum only reaches £300 after ten years' service in that grade; and the male assistant nurse after only two years' training starts at a salary of £232 14*s.* a year, while the ward sister with probably four years' general training, and at least one year's experience as a staff nurse, only begins at £230. Surely the fully qualified woman should receive more than the less highly qualified man. You note that the health visitor receives a higher salary than the district nurse; she also has the advantage over the ward sister. Under the LCC a health visitor receives £300 a year rising to £390 a year compared to the ward sister's £230 rising to £300. A health visitor in the provinces gets £270 rising to £360. The report states that the salary is designed to induce suitable candidates to enter and stay in this branch of work: surely it is equally important to induce suitable persons to become ward sisters.

KATHARINE F. ARMSTRONG,
Nursing Times. Editor.

SPINA BIFIDA, HYDROCEPHALUS AND OXYCEPHALY

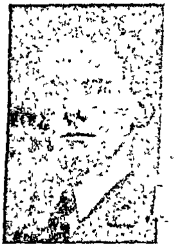
SIR,—It is with pleasure we read your leading article [illegible] more hopeful [illegible] of endoscopic [illegible] also because [illegible] focus attention upon [illegible] hese diseases which are so little known. However, we suggest that the subject is even more intricate than you describe. Thus it is not generally appreciated that the "convolutional thinning" to which you refer in association with craniostenosis is equally common in cases of spina bifida and hydrocephalus, and is sometimes seen even in normal infants. Indeed, it is doubtful if the thinning is "convolutional," since careful examination shows that the areas of thinning do not correspond in position to the gyri, and also they differ markedly in radiological appearances from those seen in "thumbing" of the skull, which are due to convolutional pressure in known cases of cerebral tumour, &c. In many cases, such as myeloceles, the intracranial pressure cannot be increased and yet the "convolutional thinning" may be very pronounced; other evidence of raised pressure, such as the increased size and width of the fontanelles and sutures, may not be present, the thinning having been shown to be independent of whether the sutures are *closed, exaggerated, or normal* in width. *Moreover,* the bone formed between the areas of thinning may be twice as thick as the normal skull, so that pressure atrophy cannot be the whole story. Finally, this "convolutional thinning." which has been called craniolacunia or craniofenestria according to its degree of development, offers a valuable guide to the prognosis of operations, and will help other surgeons to select favourable cases and to approach the excellent figures of Ingraham and his associates, which you quote.

Manchester. J. BLAIR HARTLEY.
Isleworth. C. W. F. BURNETT.

Obituary

JOHN MICHAEL BARKLA

MB EDIN, FRCSE; FLIGHT-LIEUTENANT RAF



Yerbury, Edinburgh

J. Michael Barkla was born in 1915, two years after his father Prof. C. G. Barkla, a Nobel laureate, had left the Wheatstone chair of physics in London to occupy the chair of natural philosophy in Edinburgh. Michael entered Merchiston Castle School in 1925 where he took a prominent part in games and in the musical activities of the school. He was wing three-quarters in the first xv, and in his last year won the 100 yards and the quarter-mile, equalling the school record in the former. But after entering the medical school of the university in 1933, he gave up all formal athletics, and in the vacations walked and climbed with student friends in this country and on the Continent. His university course was a series of successes. In 1938 he was awarded the Ettles scholarship as the most distinguished graduate of the year, and in the following year the Allan fellowship for clinical medicine and clinical surgery. After graduating he worked at the Royal Infirmary as c[illegible] to Dr. Fergus Hev[illegible] J. R. Learmonth, k[illegible] time he lived at the Eastern General Hospital, where he was resident surgical officer—to deal if need be with civil air-raid casualties. He was also university demonstrator of anatomy under Professor Brash from 1939 to 1941. In the autumn of 1942 Barkla joined the RAF and the following spring he went to North Africa as surgeon with a mobile field hospital. He spent a short time working [illegible] returning to the [illegible] accident. [illegible] Barkla's [illegible] and wise judgment of uncommon degree; and all these gifts he wore with a modesty that was an example to those less fortunate. He gave scrupulous care to every aspect of his work, and gained at once the respect and the confidence of those shrewdest of judges, his patients and his students. When he left to go on service, he had a fine record in the surgery of emergencies, and these practical successes depended as much on his devotion to his patients as on his operative dexterity. He was a gay *and stimulating colleague, whose untimely death robs* the Edinburgh school of a career that could not but have adorned it, and his associates there of a lovable friend."

Public Health

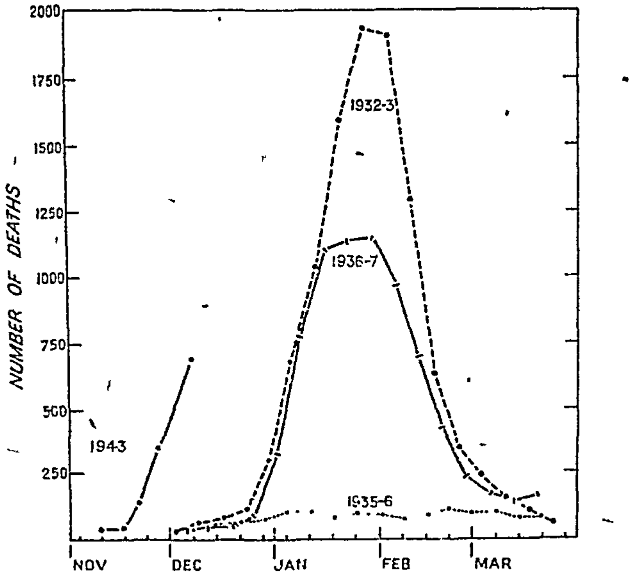
THE INFLUENZA EPIDEMIC

In the week ended Dec. 4 the Registrar-General for England and Wales was notified of 709 deaths in the great towns attributed to influenza, the largest number reported in a single week since Jan.–Feb. 1937; the R.-G. for Scotland was notified of 50 deaths. It should be remarked at once that it was chiefly the elderly who died, the age-incidence for the 72 London deaths being 0-1-0-0-2-3-3-8-11-18-26, with no hint of the shift-to-the-young of the epidemic of 1918, the fourth year of the last war. Available reports all speak of short sharp attacks, with few complications and rapid convalescence, although the hardship of wide-spread illness at such a time as this has been keenly felt. The epidemic was unexpected because the story of a 4-yearly cycle was still widely believed, despite the non-appearance of a peak in 1941, and the fact that a regular cyclical recurrence was unknown in other countries.

Week ended	AGGR.	Lond.	Grtr Lond.	NORTH	MIDL.	Manc.	B'fd	B'hm	B'tol
Nov. 13	46	6	16	19	12	4	2	2	4
20	106	10	16	56	24	4	7	1	9
27	375	29	71	172	81	44	17	20	18
Dec. 4	709	72	181	288	157	47	11	57	16

Weekly deaths from influenza in the great towns of England and Wales.

The course of the epidemic in various parts of the country can be seen at a glance from figures extracted from table 3 of the R.-G.'s returns for the last four weeks. They confirm the impression that in the Northern area, where it started, the epidemic shows signs of abating, whereas the peak is not yet within sight in the Midland area and in Greater London. For the aggregate figures of the country as a whole the incidence curve has become less steep, the rises being × 2·3, × 3·5, × 1·9 for successive weeks on the previous one. It would be unwise to predict what height the peak will reach, but a comparison with the completed course of the 1933 and 1937 epidemics (shown on the accompanying graph) suggests that 1943–44 will come to rest somewhere between the two.



Course of present epidemic of influenza alongside those of 1933 and 1937.

MEDICAL CARE ON THE FLU FRONT

Asked in the House of Commons on Dec. 9 what steps he was taking, in view of the shortage of doctors and nurses, to mitigate the severity of influenza attack the Minister of Health said he had made arrangements with the Services for temporary deferment of the call-up of [illegible]. In the difficult conditions of war-time, he added, we must all help one another and in consultation with official and voluntary organisations he had made [illegible] pecial help in the home, not forgetting [illegible] meals. In a circular letter with the same date Sir Wilson Jameson put the initiative on the county or county-borough MOH, suggesting that some such scheme as the following might prove practicable.

> General practitioners and factories with doctors in urgent need of assistance would apply to the secretary of the Local Medical War Committee stating the kind of help required—e.g., holding surgeries or visiting patients. The Secretary of the Committee, if satisfied as to the urgency of the need, might telephone the request to the County MOH unless it had been decided to decentralise the arrangements to the District MOH. The County MOH will apply to the ADMS (or the District MOH to the appropriate officer, probably to a particular miiltary medical unit in the neighbourhood). In some areas the Secretary of the LMWC should apply to nearby military medical units direct.
>
> The Regional MO is discussing with the Royal Naval and RAF medical authorities the machinery to be adopted if help is required from them, and he will inform the County MOH of the arrangements to be made.

PROBLEMS IN THE HOME

For helping suffering households the Secretary to the Ministry has asked local authorities to consider how temporary assistance can be given by the diversion or adaptation of existing services,—e.g., first-aid post or rest centre personnel, health visitors, school-nurses.

> The Ministry of Food and the Board of Education will permit arrangements on a payment basis for the provision of meals from British restaurants and school canteens, with as few restrictions as possible for the next few weeks. Where transport is a problem Civil Defence ambulances and vehicles may be used, or any existing organisation for the transport of meals to agricultural workers. Local voluntary organisations and individuals of goodwill may be able to assist. Where such arrangements are insufficient meals may have to be provided from rest centres or mobile canteens, with the consent of the Divisional Food Officer.
>
> Maternity and Child Welfare authorities have powers to provide home helps; the Red Cross Society, the St. John Brigade and the WVS have offered to help within their scope on request from medical practitioner, district nurse or hospital. The organisation for mutual help after air raids may be on a sufficiently definite basis for voluntary offers. Nursing help within the home, possibly by way of assistance to the district nurse, or at hospitals, may be provided by the whole-time staff and volunteers in the first-aid post and rest centre service. The rest centre service might also provide volunteers for other help within the home and solve the difficulties of shopping with reduced deliveries and the need to present ration books. Additional help might be forthcoming from the local youth services.

It is inevitable that for all these domestic matters arrangements will vary from place to place. Doctors and nurses should therefore keep in touch with the local MOH.

Local Colour

Influenza in the *West Country* has been extremely widespread and characterised by a sudden onset—some patients have been struck down in the streets. Generally the disease has run a short and uncomplicated course, requiring absence from work of about a week or 10 days. Fever up to 103° F. has been usual but temperatures of 105° F. or over have sometimes been noted, especially in children and young adults. The pyrexial phase is usually over in 3 or 4 days. Bronchial catarrh has been an almost universal complication; gastro-enteritis and sinusitis have been not uncommon; bronchopneumonia rather rare; œdematous pharyngitis and acute otitis media rarer still. A few days' rest in bed in a warm room, with a little reassurance from the doctor, provide all the treatment necessary in most cases, though it must be admitted that many busy and conscientious persons have worked through the disease without apparent ill effect. Asthenia and a tendency to sweat easily have been tiresome features of convalescence. Relapses have so far been rare and not often serious. Apprehension has been

as well marked as ever and pneumoniphobia rife In a word, this disease continues to prove alarming and exhausting to the patient, and boring to the doctor The peak, or at any rate one peak, now appears to have been passed

In *Aberdeen* there is a widespread epidemic of upper respiratory infections, with varying patterns of coryza, sore throat and tracheo bronchitis the cases being on the whole much milder than in the Midlands There have been no cases of the grave form of influenza seen in the 1918 epidemic, and apart from pneumonia the only complication which seems at all common is acute otitis media In the fatal cases sulphonamides have lowered the temperature but have had no effect on the pulse rate or toxic symptoms For the week ending Dec 11 there were 6 notified cases of influenzal pneumonia and 7 deaths and 5 deaths from non pneumonic influenza ,

the week before when there

ases of influenzal pneumonia

umonic influenza

As an example of conditions in the Northern area in *Leeds* practitioners are working at high pressure There is quite an epidemic of influenza, but so far it is a relatively mild illness lasting 4–5 days and with few complications At the General Infirmary 64 out of the 432 nurses have been off duty with influenza in the last six weeks Most of them had coryza and/or tracheitis and bronchitis , there were 3 cases of sinusitis and 1 of otitis media , no deaths Some patients over 60 now being admitted to the Infirmary have developed either epistaxis or atypical pneumonia as a sequel to 'flu, and people have been admitted in a state of collapse after returning to work too soon after an attack The rise in deaths certified as " influenza " is not very steep—the figure for week ending Dec 4 was 12—but this may be accounted for by a tendency to certify under broncho pneumonia or pneumonia instead Notifications of influenzal pneumonia for that week totalled only 5, and doctors being influenza conscious probably notify influenzal pneumonia more readily now than they did before the epidemic So far there have been no cases of influenzal pneumonia clinically resembling the 1918 type, and the autopsy findings confirm this view

In one *North Western Area* the influenza has appeared in three types The first, the " official ' type, starts suddenly

pyrexia

in 3 or 4

seem to be any unpleasant sequelæ The second starts like the official type, but pyrexia often reaches 103° F and takes several days to settle if the victim tries to get up too soon the pyrexia is liable to recur , this type may last 7–14 days, and is accompanied by a painful and persistent cough due to tracheitis , the patient needs a period of convalescence and may be away from work for 10–20 days The cough tends to be recurrent Elderly patients may have an irregular rapid pulse The third is a true influenzal bronchiolitis with patches of bronchopneumonia This is a severe type and has been responsible for some deaths in young as well as old patients The illness starts as usual but in a day or two râles and crepitations appear at the bases and gradually spread until most of both lungs is involved The radiographic picture is of thickened bronchi with only a few small scattered patches of consolidation The patient becomes severely cyanosed and requires oxygen almost continuously Sulphonamides do not appear to have much effect In fatal cases death occurs from respiratory failure within 7 days In cases that recover, convalescence is slow , cough is persistent and troublesome Patients with previous chronic bronchitis or other lung diseases seem specially prone to develop type 3 In this area it is type 1 that is most common , type 2 has occurred sufficiently frequently to be serious , type 3 has so far been unusual This incidence is well known to the lay as well as medical population and has caused some sarcastic comments on the Ministry of Health's attempts to minimise the outbreak As the *Manchester Guardian* said, if you re still in bed after 2 or 3 days you have only yourself to blame , you have allowed a virus not approved by Whitehall to get you !

Manchester is being visited by an epidemic which if not to be compared with that of 1918 in severity, probably surpasses it in the number affected Perhaps it is now on the wane, but in 1918 there was a mild onset, a remission in the number of cases, and then an outburst as unexpected as it was severe The present attack has on the whole been mild, and the alarming feature in 1918, of young active folk being struck down with fatal result, has been absent Deaths from influenza and influenzal pneumonia reported for the weeks ending Nov 20, 27, and Dec 4 were 4, 41, 39 but these figures give no idea of the numbers affected for the disease itself is of course not notifiable Perhaps this is good in view of paper shortage and for the sake of overworked practitioners who would have to fill in endless forms Factories business concerns and hospitals have been depleted of their staffs A ward has had to be opened to take in sick nurses at more than one big hospital, and of an outpatient clerical staff of 7 only 2 arrived on one day At one big works in the district 1200 workers were absent at a time Doctors have also suffered The most common type has been one with a three day fever, followed by catarrh of the nose and chest Many folk have had to return to work when a rest for convalescence would have been more fitting

Infectious Disease in England and Wales

WEEK ENDED DEC 4

Notifications —The following cases of infectious disease were notified during the week smallpox, 0 , scarlet fever, 2694 , whooping cough, 1757 , diphtheria, 610 , paratyphoid, 2 , typhoid, 8 , measles (excluding rubella) 451 , pneumonia (primary or influenzal) 2291 (last week 1661) , puerperal pyrexia, 136 , cerebrospinal fever, 60 , poliomyelitis, 4 , polio encephalitis, 1 , encephalitis lethargica, 3 , dysentery, 141 , ophthalmia neonatorum, 52 No case of cholera, plague or typhus fever was notified during the week

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from an enteric fever, 1 (0) from measles, 5 (1) from scarlet fever, 16 (2) from whooping cough, 21 (1) from diphtheria, 46 (5) from diarrhœa and enteritis under two years and 709 (72) from influenza The figures in parentheses are those for London itself

Exeter reported the fatal case of enteric fever Besides 57 deaths from influenza Birmingham had 5 from diarrhœa, 3 from whooping cough and 3 from diphtheria

The number of stillbirths notified during the week was 169 (corresponding to a rate of 29 per thousand total births), including 23 in London

Births, Marriages and Deaths

BIRTHS

AUBERT —On Dec 7 at Nottingham the wife of Dr Edward Aubert—a daughter

FAWDRY —On Dec 5 at Nicosia Cyprus the wife of Dr Alan Fawdry—a daughter

HOWARD —On Dec 4 in Norwich the wife of Flight Lieutenant Richard Howard FRCSE RAF—a daughter

LODGE —On Dec 4 at Oxford the wife of Surgeon Lieutenant F F Lodge RNVR—a son

O DONOVAN —On Dec 6 in Dublin the wife of Dr D K O Donovan —a daughter

PRUNTY —On Dec 8 at Hindhead the wife of Dr Garnet Prunty —a son

SMALLSHAW —On Dec 9 at Epsom Downs, the wife of Dr D B Smallshaw—a daughter

MARRIAGES

BENNETT—ALDRED —On Dec 4 at Wroxham Ronald Campbell Bennett MB to Barbara Aldred

LONGMORE—CENTLIVRES —On Nov 10 at Cape Town John Bell Longmore BM surgeon lieutenant RNVR to Virginia Centlivres

DEATHS

GIBSON —On Dec 4, at Ealing Francis Maitland Gibson BSC MB EDIN formerly director of the King Institute of Preventive Medicine Madras aged 80

GOSSAGE —On Dec 10 at Chertsey William Herbert Gossag

ert Hitchings MRCS

nts William Massingberd

late RAMC formerly cf

MRCS of Ealing Green

LAUDER —On Dec [illegible] at Southbourne Bournemouth Thomas Campion Lauder MB EDIN [illegible] lieut-colonel RAMC retd

SHARROD —On Dec 9 Arthur Richard Sharrod MB LOND [illegible] Stourbridge aged 56

WILSON —On Dec 1, Roger Parker Wilson CB, FRCS lieut colonel IMS retd

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The fa [illegible]
to war [illegible]
as an [illegible]

More Beds at Queen Charlotte's?

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ANXIETY NEUROSIS IN COMBATANTS

C. P. SYMONDS, D M OXFD, F R C P

AIR-COMMODORE; CONSULTANT IN NEUROPSYCHIATRY, RAF; PHYSICIAN FOR NERVOUS DISEASES, GUY'S HOSPITAL; PHYSICIAN, NATIONAL HOSPITAL, QUEEN SQUARE, LONDON

THERE is little difficulty in describing the symptoms of what is generally called an anxiety neurosis as they are seen in combatants, nor is there much doubt in most cases about the origin of this neurosis in a state of fear. It is much more difficult to give an account of the process by which fear, which may be regarded as a normal state, under certain conditions of flying or battle stress gives rise to the neurosis [illegible] or morbid state. [illegible] present time, is d[illegible] Freud and his foll[illegible] anxiety is an affe[illegible] emotional conflict there is frustration of instinctive desire. In the case of war neurosis, whether in flying personnel or other combatants, the conflict is between the instinctive forces of duty, self-respect and loyalty on the one hand and self-preservation on the other. This point of view is succinctly stated by Gordon and Hargreaves (1940) thus:

> "In the last war it was said that soldiers broke down because they could not stand the strain of war, but it was really the strain of conflict between their self-preservation instinct and the demands of the ideal they had set themselves in respect of duty and self-respect. Such a conflict, whatever it be, will induce a severe sense of insecurity with its attendant emotion of anxiety. If the conflict is not resolved the anxiety continues. . . ."

Those who support this hypothesis generally assume that the sufferer is himself unaware of the nature of the conflict.

Curran and Guttmann (1942) say: "The sufferers (from anxiety states) are usually unaware of the nature of their conflicts or at least do not face them openly," though in a later publication (1943) they imply that an anxiety state may arise without conflict. Henderson and Gillespie (1940), who [illegible] ance . . . dependent in a way unknown to the patient on mental causes; or a mental disturbance not the result of bodily disease . . . which the patient realises to be abnormal and the m[illegible] nature of [illegible] is various[illegible] "as a condition of fear not clearly focused on any special object"; James (1940) as an emotional state closely allied to fear; Henderson and Gillespie (1940) as "a state of morbid fear."

AN ALTERNATIVE CONCEPTION

These extracts are representative of a view which regards the anxiety neurosis or psychoneurosis as an affective st[illegible] al with fear, having [illegible] f which the patient [illegible] In war the conflict [illegible] forces. A different conception is that which refuses to accept the doctrine of a specific psychopathology. According to this view the anxiety neurosis is a state of fear which is morbid only in so far as it is not adequately accounted for by the circumstances in which it is present. It is conceived simply as a disturbance of function in that part of the minc[illegible] h is concerned with [illegible] xed pathology, whe[illegible] is included in this [illegible] ny factors may ope[illegible] ay be hereditary, [illegible] ety neurosis accordi[illegible] be precipitated by cerebral injury, infection or intoxication, especially if there is inherited predisposition, without the existence of adequate psychical factors. It may equally result from psychical causes such as catastrophe or danger without any physical factor, or both factors may operate together. The exponents of this view regard the anxiety neurosis of war as a morbid state of fear developing out of a natural state of fear, allowing at the same time for physical factors such as exhaustion, infection or intoxication.

Thus Mapother (1935) stated that the anxiety neurosis of war "was an over-excitability of the fear mechanism and was constitutional, or the result of stress of special duration or severity, perpetuated by situations which had become conditioned stimuli in the particular individual." In his evidence before the Shell-Shock Committee (Mapother 1922) he had expressed a similar opinion with regard to shell-shock, stating that it was "due to mental strain or shock too prolonged or too intense for the particular individual to endure without the emotion becoming persistent. In some cases the strain or shock was quite inadequate to cause the resulting symptoms in a normal man, but was adequate for that individual on account of constitutional predisposition or acquired predisposition due to bodily causes such as infection."

Thus the anxiety neurosis of war has been explained by two quite different theories, one assuming a particular affective disturbance resulting from unconscious emotional conflict, the other assuming an undue intensity or persistence of fear due to over-stimulation of the fear mechanism. Both hypotheses have in common the assumption that fear is the original source of the neurosis.

TWO CONCEPTS OF ANXIETY NEUROSIS COMPARED

It is necessary for the argument at this stage to consider briefly the ways in which these two concepts have developed. T[illegible] founded upon Freud's [illegible] resulting from conflict [illegible] ego. No attempt can be made here to explain in detail what is meant by these terms. Broadly speaking however the libido included all positive urges or desires which could possibly be associated [illegible]: the ego stood for the rest of [illegible] ufant the libido was unimpeded. [illegible] developed education and social pressure made conflict inevitable. [illegible] a split occurred between [illegible] together with the ideas [illegible] being relegated to the [illegible] e barrier of repression. The libido could pass this barrier only in a form acceptable by its custodian the censor. Successful passage of the barrier was described as the process of sublimation and this process was the essence of mental health. Failure of sublimation was likely to result in a piling up of libido whose attempts to pass the barrier of repression were frustrated. Such frustration of the libido gave rise to a feeling of tension or affective disturbance, which constituted the basis of the anxiety neurosis. This theory, enunciated before t[illegible] conflict always to be betwee[illegible] During that war the freq[illegible] neurosis under conditions in [illegible] the source of the neurosis was [illegible] to modification of the theory by many of its exponents (Rivers 1921, Hart 1929). The anxiety neurosis according to this modification could result from frustration of any one of the instinctive forces, and [illegible] instinct frustrated was that [illegible] The mechanisms of repressi[illegible] were the same as those whic[illegible] was between the sex urge and other elements in the personality, and the resulting feeling of mental tension or anxiety was also the same. This last point is of considerable importance for it is on this assumption that statements such as those already quoted are based, to the effect that the anxiety neurosis of war is not directly due to the effects of fear but results from the battle within the individual. The symptoms of an anxiety neurosis are the symptoms of conflict; the one party to the conflict is the ego or personality; whether the other party is sex or fear the symptoms will be essentially the same. As has been seen the exponents of this theory are not always explicit as to the extent to which the scene of the conflict is confined to the unconscious, but incline to the belief that it is nearly all, or nearly always, unconscious so that the sufferer while aware of his symptoms is unaware of their cause.

This account of the psychopathological theory of anxiety neurosis is so brief that it cannot claim accuracy

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Thus the anxiety neurosis of war has been explained by two quite different theories, one assuming a particular affective disturbance resulting from unconscious emotional conflict, the other assuming an undue intensity or *persistence of fear due to over-stimulation* of the fear mechanism. Both hypotheses have in common the assumption that fear is the original source of the neurosis.

TWO CONCEPTS OF ANXIETY NEUROSIS COMPARED

It is necessary for the argument at this stage to consider briefly the ways in which these two concepts have developed. T[illegible] is founded upon Freud's [illegible] as resulting from conflict [illegible] ego. No attempt can be made here to explain in detail what is meant by these terms. Broadly speaking however the libido included all positive urges or desires which could possibly be associated [illegible] ego stood for the rest of [illegible] the libido was unimpeded. [illegible]ped [illegible]able. [illegible] a split occurred between [illegible] together with the ideas and memories centred upon it being relegated to the unconscious and kept there by the barrier of repression. The libido could pass this barrier only in a form acceptable by its custodian the censor. Successful passage of the barrier was described as the process of sublimation and this process was the essence of mental health. Failure of sublimation was likely to result in a piling up of libido whose attempts to pass the barrier of repression were frustrated. Such frustration of the libido gave rise to a feeling of tension or affective disturbance, which constituted the basis of the anxiety neurosis. This theory, enunciated before the last war, supposed the conflict always to be between sexual urge and repression. During that war the frequent occurrence of anxiety neurosis under *conditions in which it was quite clear that* the source of the neurosis was fear led to modification of the theory by many of its exponents (Rivers 1921, Hart 1929). The anxiety neurosis according to this modification could result from frustration of any one of the instinctive forces, and under war conditions the instinct frustrated was that of self-preservation, not sex. The mechanisms of repression and sublimation however were the same as those which operated when the conflict was between the sex urge and other elements in the personality, and the resulting feeling of mental tension or anxiety was also the same. This last point is of considerable importance for it is on this assumption that [illegible] such as those already quoted are based, to [illegible] neurosis of war is not directly [illegible]r but results from the battle [illegible] The symptoms of an anxiety *neurosis are the symptoms* of conflict; the one party to the conflict is the ego or personality; whether the other party is sex or fear the symptoms will be essentially the same. As has been seen the exponents of this theory are not always explicit as to the extent to which the scene of the conflict is confined to the unconscious, but incline to the belief that it is nearly all, or nearly always, unconscious so that the sufferer while aware of his symptoms is unaware of their cause.

This account of the psychopathological theory of anxiety neurosis is so brief that it cannot claim accuracy

in detail, but must serve for discussion in the present context. It is a theory which has been widely accepted, and is assumed by many writers on the subject to be entirely satisfactory. The validity of this theory however has been subject to serious criticism, some of which is aimed at the fundamental structure of psychopathology. Hart (1929), for example, has pointed out that the evidence upon which the psychopathological theory of neurosis is based is derived not from the patient's statements or admissions but from the psycho-analyst's interpretation of these statements, and that the psycho-analyst may be biased by the tenets of the school to which he belongs. Mapother (1933) considers the conception of specific instinctive forces as a means of evading rather than meeting problems of fact.

Psychopathological theory can offer no explanation of anxiety neurosis following cerebral injury or physical illness, except by assuming that such physical factors are not of primary importance and that the true cause is to be found by the experienced analyst in unconscious conflict. The answer to this is that the experienced analyst starting with this assumption may, by bringing to the attention of his subject conflicts which may exist in the mind of anyone, find in them a causal significance which does not in fact exist. With regard to the anxiety neurosis of war, when this appears in its simplest form as a state of fear immediately following exposure to intense or long stimulation, of fear-evoking quality, the psychopathologist is obliged by his theory, as we have seen, to postulate an intermediate stage in which fear enters into conflict with other emotional forces with consequent generation of another kind of fear. A simpler explanation of the observed facts if valid would be preferable.

The alternative theory of anxiety neurosis relates it to other varieties of affective disorder, for example elation or depression, the criterion of morbidity being the inadequacy of the circumstances when fully known to account for the degree or duration of the affect as judged by normal standards. According to this view, as we have observed, the affective disorder may be precipitated in persons with inherited liability by a variety of physical causes as well as by emotional stimulation. When the latter is causally operative there is not necessarily correspondence between the quality of affect aroused by the emotional stimulus, and the quality of the resulting affective disorder, but—

> "The nearest approach to a specific connection between the precipitating happening and the type of affective disorder is seen in the anxiety disorders which follow a terrifying experience such as exposure to shell fire" (Mapother and Lewis 1937).

It is obvious that terrifying experiences are much commoner in war than in peace. Therefore one would expect the anxiety neurosis of war to have its origin more often in terrifying experience than from any of the other possible causes.

It has been observed that this latter concept of the anxiety neurosis is descriptive and makes no attempt to explain the process whereby normal fear is transmuted into morbid fear. I have attempted (Symonds 1941) an explanation in physiological terms based upon the analogy of pain.

One of the objections which may be levelled at the hypothesis of the direct development of an anxiety neurosis from fear is that as the result of a terrifying experience fear very often does not appear immediately but after an interval, or if it does appear immediately it is of only mild degree and increases later. This is certainly true when the stimulus in relation to individual threshold is not of maximal intensity, and when other stimuli simultaneously evoke other types of affective response. In these circumstances, as I have argued elsewhere, fear may be completely or partially inhibited, to appear later in its full force when the stimuli responsible for its inhibition are no longer effective (Symonds 1943). When however the stimulus is of maximal intensity heedless flight is undoubtedly associated with intense fear. Immediate fear also results when the situation is such that there is nothing to arouse other types of affective response, when for example the individual is alone, without call of duty to others, and with no stimulus to manipulative activity. Other factors may also be taken into account, without the necessity of supposing emotional conflict. As I have already stated, the idea of danger either in reflection or anticipation may be a more potent stimulus to evoke fear than the actual presence of danger. The time factor here is important. When danger is sudden and transient only a part of the danger, sometimes only a small part, can be appreciated at the moment. Reflection gives time for fuller perception, with consequent increase of the stimulus. The same is true of anticipation. If there is time to study the picture of approaching danger in detail the total fear stimulus is greater than when it is seen momentarily and in part.

A second objection related to the first is that the state of morbid fear which is characteristic of anxiety neurosis only results from normal fear when there exists the possibility of conflict between fear and other emotions. But while it is true that in most situations in which fear is aroused the possibility of such a conflict does exist, there are striking exceptions. The example of panic flight has already been mentioned. This is a state often observed under conditions of war in which the sufferer is overwhelmed by fear to the exclusion of any other emotion as far as can be judged by his behaviour and subsequently from his own account of his feelings. The affective disturbance may persist long after his efforts have removed him far from danger. It may indeed persist for several weeks or months under conditions in which there is no longer any adequate cause for fear. It has been argued that such persistence of a morbid fear state following flight is due to conflict in so far as the wish to have behaved bravely has been frustrated by the wish to escape; but there are instances in which it is difficult to accept this explanation, the situation having been one in which no man could have been expected by himself or others to take any course other than flight. The state of morbid fear which develops following reflection upon a terrifying experience furnishes another example of a situation in which the materials for conflict may be absent. The sufferer may have behaved in a dangerous situation in such a way that he has no cause for self-reproach, and that situation may have been one which he will not have to encounter again, yet the state of fear persists.

The psychiatrist who assumes that the anxiety neurosis must invariably be due to emotional conflict will claim that its absence in cases such as those we have taken is only apparent, and will find for the patient's behaviour or his statements as interpretation which supports this assumption; but herein as we have observed may lie the weakness of his method and his claim. It is somewhat remarkable that for another type of affective disorder—depression—many psychiatrists are ready to admit the possibility of development of the morbid from the natural state as the result of excessive stimulation added to predisposition, but are unwilling to accept this possibility in the case of fear. Such a morbid state of depression they classify as endogenous, meaning by this that the catastrophe which has initiated the depressive state has acted as a spark to some inner store of tinder. If this is admitted for one type of affective disorder why should it not be admitted for another? An answer is it seems to be found in the definition of anxiety neurosis in terms of a set psychopathology.

There is possibly however a further explanation of the unreadiness of many psychiatrists to accept as simple an explanation of certain cases of anxiety neurosis as they are ready to admit in depression. In civil life conditions which will evoke intense depression are common: conditions which will evoke intense fear are rare. The development of a depressive state as the result of over-stimulation of the depressive affect occurs so often that it has been well recognised. Over-stimulation of the fear mechanism being uncommon has not been so well appreciated, though as the result of motor or flying accidents, shipwreck or earthquake examples do occur. The conditions of war are of course entirely different and it is noteworthy that psychiatrists with first-hand experience of war material have often expressed themselves in terms which admit the direct development of fear into anxiety neurosis. Dillon (1940), for example, states that 70 % of the cases of war neurosis he observed in the field represented—

> "A direct anxiety or fear state characterised by generalised shaking, nervousness, jumpiness, and sometimes dizziness

and headache. This was the commonest form of "shell shock," the symptoms of which constitute the basic features of all forms of the neuroses of war.

THE ROLE OF CONFLICT

There is then some warrant for the belief that an anxiety neurosis may develop as a direct result of over-stimulation of the fear mechanism, that this is a common occurrence in war, rare in civil life, and that emotional conflict is not essential for the causation of an anxiety neurosis whether in civil life or war any more than it is essential for the causation of other kinds of affective disorder, for example depression. These views are by no means incompatible with the supposition that emotional conflict may be an important or common cause of neurosis, either alone or as a factor complicating other causes.

We are all aware from introspective experience that conflict between opposing emotions has an unpleasant affective quality of its own. The quality is difficult to describe. It is a feeling of tension, uneasiness or insecurity which is distinct from other affective states though it most nearly resembles fear. It is recognised as a natural part of the reaction to a situation or idea which evokes opposing emotions and though it is an unpleasant feeling it is up to a point beneficial in sharpening judgment. This variety of affect is generally called *anxiety*. It lasts normally as long as the emotional conflict exists. As a rule the conflict is resolved by some action or decision taken by the individual whereby one set of emotions is further excited and the other set inhibited. The affective state of anxiety then disappears. There are many normal situations however in which emotional conflict is continuous over long periods and anxiety in lesser or greater degree also continues. We may speak therefore of chronic anxiety as well as acute anxiety, using the word anxiety here in a specific and restricted sense meaning the affective state engendered by emotional conflict; and may regard acute or chronic anxiety as normal so long as the circumstances when fully known appear to justify its existence. We must also be prepared to admit considerable individual variation in the readiness with which anxiety is aroused, its intensity and its persistence, these variations depending as in the case of other types of affective response both on heredity and experience. If the emotional conflict is sufficiently intense or prolonged, or if individual sensitiveness in respect of anxiety is greater than the average, and especially if both factors operate together, a morbid state of anxiety may develop which as in the case of other affective disorder once it gets beyond a certain point will persist, despite the absence of adequate cause. That such morbid states occur is well recognised in clinical psychiatry, and they are at present generally included under the heading of anxiety states. They have been described also as states of agitation or tension. It is as reasonable to suppose that intense though normal anxiety of the kind that arises [illegible]

CONFLICT NEUROSIS AND FEAR NEUROSIS

We have now reached a point in the discussion at which it is evident that we must distinguish in name as we have already distinguished in quality between a neurosis of conflict and a neurosis of fear. Hitherto we have followed custom in including both under the title of anxiety neurosis. Our [illegible] we have already indicated [illegible] ciated with emotional conf[illegible] distinct from fear. The a[illegible] of fear are separable and [illegible] affects we may recognise t[illegible] a conflict neurosis and a fear neurosis. The latter we have already considered as a typical affective disorder which may result from a variety of causes—inherited, physical and psychical. The conflict neurosis may be regarded in the same light. Among the patients customarily regarded as suffering from an anxiety neurosis, there are many whose major complaint is neither of fear nor depression, but of uncertainty, indecision, tension and restlessness without adequate cause. In its most severe form this kind of affective disorder may be classified as psychotic and has been described as depression with tension (Muncie 1939). A conflict or tension state of this kind is most apt to develop in persons predisposed by heredity either to this or some other form of affective disorder. It may be precipitated by physical or psychical causes or by a combination of both. When psychical causes are operative they are usually to be found in the form of intense or long-continued emotional conflict. The sufferer from a conflict neurosis like the sufferer from a fear neurosis is in consequence of his illness more easily disturbed by appropriate stimuli which are in this case such as simultaneously excite opposing emotions.

Of the two neuroses into which we have thus subdivided the anxiety neurosis the conflict neurosis is by far the commoner in civil life because occasions for emotional conflict are common and occasions of intense or prolonged fear are rare. Moreover one of the commonest emotional conflicts und[illegible] tween sexual and other [illegible] factors are a cause of [illegible] desire is quite comm[illegible] Herein probably lies t[illegible] of Freud's original conception of the anxiety neurosis as resulting from frustration of the libido. Under conditions of war not only is the fear neurosis much commoner than in peace, but the conflict neurosis, which is equally common, is usually derived from a conflict between fear and other emotions, instead of sex and other emotions.

W[illegible] the fear neurosis or the co[illegible] in a pure state uncompl[illegible] other type of affective disorder. It is however a commonplace of clinical psychiatry that most affective disorders are mixed states. Under conditions of war there is special opportunity for admixture of the affects of fear and conflict and out of this may arise various combinations. Normal fear versus other emotions may lead to a conflict neurosis in which, so long as the dangerous situation persists, the affect of fear is also present. A fear neurosis, so long as other and opposite emotions are present to contend with it, will be attended by the affect of conflict, or fear neurosis and conflict neurosis may coexist, both affective states existing or persisting in circumstances which do not justify their existence. Such distinctions may appear somewhat academic for in practice it is often extremely difficult in the analysis of a mixed state of fear and conflict to decide whether one or the other or both are morbid as opposed to natural. I believe however that the distinction which I have supposed to exist between the affective states of fear and conflict deserves emphasis, for it provides an explanation of a divergence of opinion as to the nature and causation of the anxiety neuroses of war which has been responsible for a good deal of confusion. For this reason if for no other, fear neurosis and conflict neurosis might well be employed to supplant the term anxiety neurosis, which like other psychiatric labels in the past has acquired so many different connotations that it has become a hindrance rather than a help to clear thinking.

DEVELOPMENT OF WAR NEUROSIS

Making use of the distinction and the terms which have been suggested, I shall now trace in outline the development and symptoms of the common type of war neurosis. It is necessary in the first place to reassert that fear is a state which is natural, especially in such circumstances of extreme, continued or repeated danger as exist in war. The ease with which fear is aroused however, and its intensity and duration will depend upon factors other than the intensity or duration of the stimulus. These factors comprise the innate sensitiveness of the individual and the sensitiveness or lack of it which is acquired as the result of conditioning and experience. Such sensitiveness whether innate or acquired may be specific for certain kinds of danger. The affective state of conflict when fear exists is equally natural under most circumstances, for danger in war as a rule excites affects other than fear—sense of duty to others and concern for one's own reputation. If these inhibit fear [illegible] the appearance of fear, or if fear inhibits the other set of affective stimuli, there is no conflict but fear and opposing affects are aroused, a state of conflict must exist.

Upon these assumptions let us base an imaginary sketch of the mental state of a healthy minded person under stress of war. He first experiences fear at a stage in his military career before he is ever exposed to danger, fear lest he may be afraid and be found wanting in comparison with his comrades under an ordeal which is generally considered to be the crucial test of manhood. When confronted with the actual ordeal he experiences another kind of fear which is met by his desire to play his part well and support his comrades. Therein lies conflict. With repeated exposure to danger he becomes conditioned or seasoned by experience so that he acquires some degree of fearlessness. Stimuli which at first aroused fear are now inhibited, and conflict is less. With greater experience there is an increasing chance that intense or repeated excitation will overcome inhibition, or that fatigue, illness or injury may impair the inhibitory state. Fear and conflict therefore return and tend to increase if the experience of danger is continuous. With removal from danger the affective state returns to normal, though there may be an initial phase of increased fear owing to the removal of inhibition. When the time comes for facing danger again there is anticipatory fear based this time upon past experience of the affective distress of immediate fear and conflict. This fluctuating state of fear and conflict may continue indefinitely, with relief from the unpleasant affective disturbance when there is removal from danger. If this be so it may be said that fear and conflict are present only when there is adequate cause.

The development of a fear neurosis may be outlined thus. As a result of over-stimulation—to which individual sensitiveness as well as strength or duration of external stimulus may contribute—a state of fear is generated which persists even when the sufferer is removed from danger, and is further excited by stimuli which would previously not have aroused fear at all. His mind is haunted by fear when he is in circumstances of peace and quietness: he is frightened of traffic or of sudden noises. Whether there is conflict, or if there is, how much, will depend upon the morale of the individual—that is upon his ideals of duty and self-respect. In some persons there is no conflict—fear is naked and unashamed. This is the uncomplicated fear neurosis, but except as the immediate result of some intense and overwhelming danger it is uncommon. As a rule the sufferer from a fear neurosis is inclined to be ashamed of his fears and to combat them, so that added to the state of fear is that of conflict. If individual morale is high the state of conflict develops to a pitch at which overstimulation results in a continued state of tension and unrest so that though the sufferer is assured by his fellows and by the doctor that there is no justification for his self-criticism and accepts these assurances with his reason the feeling of conflict persists. This combination of fear and conflict neurosis is one of the commonest types encountered among men of good morale.

In other cases the repeated arousal of conflict by intermittent fear may lead to a continuous state of that affective state of tension, that feeling of being keyed up to fight against oneself, which is characteristic of conflict, even when fear is absent. Though he is removed from danger and there is neither cause for, nor feeling of, fear the sense of conflict remains and continues. This is the uncomplicated conflict neurosis which again is uncommon by comparison with mixed forms. The admixture of fear and conflict as component affects of the anxiety neurosis of course does not exclude others such as depression. In practice the affective neurosis is nearly always a mixed state.

CRITERIA OF WAR NEUROSIS

We have so far made no further attempt to define the boundary which is presumed to exist between anxiety neurosis and health—that is to say, between affective disorder and normal affect—than the statement that an affective state which appears to be unjustified by the circumstances in which it is present is to be considered [illegible] and therefore evidence of neurosis. We have [illegible] this statement with the remark that these [illegible] must be fully known to the observer [illegible]s able to make the distinction. The qualification is obviously important; for the causes of what may eventually be considered a natural degree or persistence of affective disturbance are often not superficially apparent. The final criterion however is that which relates the affective disturbance observed to what might be expected of the "average" person in similar circumstances. This dividing line is relative and subject to variation. For example, if in peace-time a civilian passenger was involved in an air crash in which he himself was injured and a friend was killed, a persistent fear of flying might be judged normal; but under conditions of war there is sustained excitation of other affects which tend in the normal person to inhibit fear, so that in a member of aircrew who had had such an experience as we have described persistent fear might be regarded as abnormal. But if the squadron morale happened at the time to be relatively low the airman would be more vulnerable and persistent fear might be regarded as normal. It appears then that the dividing line between neurosis and normal affect is arbitrary depending upon the current estimate of how intense or persistent affective disturbance should be in the normal person under given circumstances.

A further question to be discussed is the importance, as a criterion of neurosis, of unawareness in the individual of the nature, or causes, of his affective disturbance. We have noted that the psychopathological theory of anxiety neurosis lays considerable stress on the origin of the affective disturbance in the unconscious. According to this theory it is chiefly because certain feelings and thoughts are repressed and kept out of consciousness that they are potent for harm. When they are brought into consciousness most of their power is lost. In the anxiety neurosis of war the feeling of fear and the desire for escape together with the memories and thoughts associated with this feeling and desire constitute a constellation or complex which, existing in the unconscious, is at war with the rest of the personality. It is this secret battle within the mind which is the essential cause of the neurosis. Psychiatrists of another school are more elastic in their views.

Thus Mapother and Lewis (1937) write: "Consciousness . . . is only an *attribute* of mental happenings, not their essence or criterion; mental life goes on with various degrees of consciousness attaching to it. There is no sharp division between conscious and unconscious mental life: no region called 'the unconscious' with its own rules and contents. Many of the psychological happenings most significant for psychiatry go on without clear consciousness of them, but in appropriate conditions they may be accompanied by much more, or by full consciousness."

If we take the latter point of view we shall regard the question whether the individual is aware of the nature or causes of his affective disorder as of little value as a criterion of its morbidity, since unawareness of much that is happening in the mind is a natural feature of mental life. A man may be sad, frightened or happy without being fully aware of his state of feeling or the events which have led up to it, and this may be considered normal. This does not mean however that self-deception and repression may not at times play an important part in the symptomatology of affective disorder.

An affect must be felt before it can exist. There can therefore be no such thing as unconscious affect, but a man may nevertheless be unaware of the nature of affect within himself. This is a commonplace in war when the admission of fear is so unwelcome that the very word is excluded from the vocabulary of the soldier, though he may allow himself to speak of "wind up," a term which also includes the uneasiness of conflict between fear and other emotions. Such unawareness cannot, per se, be regarded as morbid, nor when fear or conflict have developed into neurosis can unawareness of nature or cause be regarded as an essential feature of the neurosis. Individuals may be more or less aware of the true character of affective disorder as of normal affect, and the degree of awareness may depend upon many different factors including intelligence, capacity for introspection and previous experience, as well as reluctance to face unpleasant facts. Of two men suffering the distress of a persistent and morbid fear, with the bodily disturbances usually associated with it, one may complain that he feels ill, has palpitation and indigestion and does not know what is wrong with him: the other may come to the doctor complaining that he is in a constant state of fear. Both may be making an equal effort to persist in the face of danger despite their neurosis, with resultant symptoms of conflict. One will add to his complaint of feeling ill, that of being restless, tense and irritable, again submitting these sensations as part of an illness which he does not understand, the other will admit that the effort to control his omnipresent fear has resulted in a state of tension which is unbearable. Both men are suffering from neurosis. The one is aware of its nature and causes, the other is not. T[illegible] awareness nevertheless has an [illegible] form and further developmen[illegible] man who lacks awareness is likely by a further process of self-deception to find in [illegible] to himself and others as tl[illegible] escape from the situation [illegible] of his neurosis, and is nov[illegible] with awareness there is no such means of escape. Consequently neurosis is aggravated by more prolonged stimulation of the affective mechanisms concerned, reaches a more severe degree and is less amenable to treatment. Awareness therefore is for the individual at the same time an advantage and a disadvantage. It protects him from hysteria, but renders him liable to more protracted and more severe states of fear and conflict.

SUMMARY

Anxiety neurosis in flying personnel and in troops in the battle zone generally arises from fear. There are two different views of the process by which the neurosis develops. One supposes that there is a conflict between fear and other emotions, of which the sufferer is generally unconscious, and that the affective disturbance results from frustrated instinctive desire. Another view is that over-stimulation of the fear mechanism can result in a persistent and morbid state of fear. The arguments for and against each of these hypotheses are reviewed.

It is suggested that the anxiety neurosis of war includes two kinds of affective disorder. The dominant affect in one is fear and in the other a state of tension associated with emotional conflict. Either affective disorder may occur alone though generally they occur together.

The distinction between anxiety neurosis and normal affective reaction is discussed in relation to flying and [illegible] this distinction [illegible]

[illegible] ety neurosis of unawareness in the individual of the nature and causes of the affective disorder from which he suffers is discussed and it is concluded that lack of awareness is not an essential feature of the neurosis, though it may in certain respects influence its pattern and prognosis.

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CLINICAL STUDY OF AN OUTBREAK OF INFLUENZA B

DURING THE WINTER, 1942–43

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(From a military laboratory)

BETWEEN November, 1942, and the end of February, 1943, an epidemic of influenza B was investigated in *certain military units.* This paper records the clinical data (see also Stuart-Harris, Glover and Mills 1943).

In one of the units notes were made on 42 cases, 31 of which were studied by one of us (J. M. S.), 7 by Lieut. A. B. Kinnier Wilson, RAMC, and 4 by Major T. M. A. Lewis, RAMC. All the patients had been admitted to camp reception statio[illegible] infections, although [illegible] typical of influenza. [illegible] fuss, USAMC, records [illegible] 1st Medical General [illegible] suffering from influenza-like illnesses, were also available.

Hirst serum tests were made on both acute and convalescent sera of all these patients and according to the rise of antibody to influenza B they may be placed in three categories:—

1. *Significant rise of antibody (4-fold or greater)*

21 from reception stations 11 from American hospital	Influenza B.

2. *No rise of antibody*

14 from reception stations 12 from American hospital	3 diagnosed clinically as atypical pneumonia. 23 influenza Y (undetermined ætiology).

3. *Doubtful rise of antibody (2–3 fold)*

4 from reception stations 2 from American hospital	Unclassified.

Sera from all cases in categories 2 and 3, and from 6 cases in category 1 were also tested against virus A, but no significant rise in antibodies was detected. The term influenza Y (Rickard et al. 1941) was given as a matter of convenience to the group of cases of cli[illegible] ined undetermined by [illegible] otion station cases were recorded in sufficient detail for comparison of influenza B and Y groups with each other and with 60 collected cases of influenza A (Stuart-Harris 1941). The table indicates that the three groups differed little clinically. This agrees with the opinions of the clinical observers, who could not differentiate between them.

SYMPTOMS AND SIGNS COMPARED

—	1942–43		1937–41
	Influenza B (24 cases)	Influenza Y (12 cases)	Influenza A (60 cases)
ONSET (%)			
Sudden	78	100	75
Promonitory symptoms	30	0	18
SYMPTOMS (%)			
(a) *Constitutional—*			
Sweating	91	58	17
Headache	83	100	85
Shivering	82	83	80
Malaise	80	100	87
Anorexia	79	91	71
Muscular pains	75	66	60
Giddiness	58	55	32
Nausea or vomiting	29	33	17
Photophobia	14	8	20
Insomnia	12	0	38
Fainting	7	0	5
(b) *Respiratory—*			
Cough	92	58	88
Coryza or nasal obstruction ..	66	58	80
Sore throat	42	50	48
Substernal chest pain	33	17	11
Sputum	24	54	31
Hoarse voice	12	8	10
Other chest pain	0	19	0
Epistaxis	0	0	8
FEVER			
Average length	3 days	3·85 days	3 days
Secondary rise (diphasic curve) ..	46%	0%	21%
Average maximum temperature ..	100·6°F.	102·5°F.	101·2°F.
ABNORMAL SIGNS IN CHEST	18%	33%	35%

[illegible] ng [illegible] we[illegible] inc[illegible] negative serologically) so that the average fever in the influenza Y group was only one day after admission to hospital, compared with two days for influenza B. The cases at the American hospital probably represented a truer sample of the current respiratory infections than did the febrile patients in the camp reception stations.

In addition to clinical data, X-ray findings were available in 20 cases, and leucocyte counts in all 25 cases in the American hospital.

The chest skiagrams of 8 of the patients with influenza B taken at various stages from the 2nd to the 7th day were normal; one other showed doubtfully significant increase in hilum shadows on the left side during the fever. In the influenza Y group skiagrams taken from the 2nd to the 11th day were normal in 8, and indicated pleuritis of the right base in one. One other patient at the American hospital with negative serological findings had lung changes suggestive of atypical pneumonia, and 2 in the camp reception station group were similarly diagnosed on clinical and radiological grounds.

The importance of the radiological findings in true influenza B was that atypical pneumonia had occurred sporadically among British troops in the area during the previous nine months, and the disease was also prevalent among American troops in an adjacent locality. Chest complications were singularly infrequent in cases from all areas during the period of influenza prevalence.

Leucocyte counts, on admission, varied from 3400 to 10,000 per c.mm. in the cases of influenza B, and from 3300 to 12,000 in influenza Y. Differential leucocyte counts were also insufficiently deviated for diagnostic purposes.

DISCUSSION

Nigg et al. (1942) describe an influenza-like epidemic in a mental hospital during May, 1939, which was subsequently found to be due to influenza virus B. They compare its clinical features with those of influenza A occurring earlier in the same year and note that influenza B differed from A in that coryza was commoner and generalised aching less common, while the average temperature of the B group tended to be a little lower. White-cell counts were about the same for both. The unreliability of mental patients as regards symptoms made it difficult to determine the significance of the clinical differences, but in any case they were not clear enough to afford means of separation.

In our series influenza B differed little from influenza A either in general aching or incidence of coryza, although the average maximum temperature was slightly lower. We too concluded that clinically the two groups were indistinguishable.

Taylor et al. (1942) compare 23 cases of influenza B seen in the Argentine during 1941 with a group of influenza A cases in the previous year. They believed influenza A to be somewhat more severe and more uniform in symptomatology than B. Generalised symptoms were more persistent, and sweating, body pains, expectoration and inflammation of the eyes and throat were noted more often in the A group. We were unable to demonstrate such a difference.

SUMMARY

A group of 24 cases of influenza B (proved by serological tests) is compared with a group of 12 clinically similar cases occurring in the same outbreak but showing no rise in antibody to either A or B virus (classified as influenza Y), and also with a collected series of 60 cases of influenza A. Little difference is apparent between the three groups.

The clinical findings were in general agreement with those in cases admitted to an American army hospital, whose chest skiagrams, leucocyte counts and differential counts were not diagnostically significant.

Influenza A and influenza B appear to be clinically indistinguishable in the individual patient.

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INFLUENZA IN BRITAIN, 1942–43

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THE changing character of recent influenza epidemics was discussed in a previous paper (Andrewes et al. 1941). As a four-year cycle had prevailed in England since 1929, it was anticipated that 1941 might be a peak period; nevertheless, the outbreaks that winter were relatively mild. Laboratory studies indicated that much of the sporadic clinical influenza during January, 1941, was due to influenza A virus, but ferrets were less readily infected than in earlier outbreaks and the viruses recovered were not easily adapted to mice. It was confirmed that testing of acute and convalescent human sera for neutralising antibodies is a more delicate index of infection than ferret inoculation.

During the winter and spring of 1941–42 and 1942–43 a study of influenza has been continued.

PERIOD 1941–42

During this season there were neither localised nor spreading epidemics, but fairly numerous sporadic cases, diagnosed clinically as influenza, were encountered.

The tests made by one of us (C. H. S.-H.) and by the late Miss Dora Lush, consisted in attempts to infect chick embryos with filtered garglings and in estimations of the serum inhibition titres to influenza virus agglutinin for the red cells of the fowl (Hirst 1942), both during the febrile stage of the disease and 7 to 10 days later, during convalescence (Stuart-Harris 1943). The Hirst tests were carried out with small batches of virus fluid prepared from time to time as embryos were available, and an unavoidable variation was thus introduced by the employment of different virus fluids. The importance of comparing the inhibitory power of the two sera from one individual against the same virus fluid and the same fowl red cells on the same day has been emphasised (Stuart-Harris 1943).

Serum tests made on 52 sporadic cases of influenza and also of atypical pneumonia in the winter of 1941–42 yielded entirely negative results; a few garglings received from military units were tested on ferrets also with negative results. It was thus confirmed that no influenza virus infection of a known type was current during this season.

PERIOD 1942–43

Epidemiology.—During the winter 1942–43 an investigation of acute respiratory infections was carried out in two divisions in which cases were officially notified (Stansfeld et al. 1943). In division B the notifications were subdivided into febrile and afebrile, but in division A they included all cases of colds, sore throats, pharyngitis, tonsillitis, influenza, bronchitis and pneumonia, whether febrile or not. The incidence of respiratory infection was low in both divisions, even during January when a sharp rise took place and for a fortnight there was a mild outbreak in most of the units. Some regiments, however, had merely sporadic cases of influenza such as are seen regularly at this time of year. The notifications in division B during January indicated a much greater proportional increase in febrile than in afebrile cases.

Clinical and laboratory investigations.—During the entire period in division A, and from January to March in division B, tests were made on garglings and sera collected from cases of upper respiratory tract infections. A few specimens were also received from civil or military patients in other areas, including patients admitted to the 1st Medical General Laboratory of the US Army. Tests were made in all upon 15 individuals most of whom suffered from attacks of clinical influenza of varying severity. A few were selected for study for special reasons, such as clinical resemblance to atypical pneumonia (2 patients in November) or lack of febrile reaction (4 patients in January), and so far as possible febrile patients from division A were studied irrespective of symptoms. Sera from 4 cases diagnosed as "gastric influenza" were examined in April.

In contrast to the previous season when no significant rise in antibody was detected by the Hirst test, differences in titre between acute and convalescent sera were noted. From the middle of December, 1942, until the middle of February, 1943, a proportion of the cases upon which serum tests were made showed an increase in antibody to influenza virus B, but not to influenza A.

The entire series of tests in 1942–43 were made with reconstituted dried allantoic fluid kindly made available by Dr. G. K. Hirst of the International Health Division of the Rockefeller Foundation, New York. Early in 1943 Hirst's new technique (1942) was adopted using 0·5 c.cm. quantities of serum and virus and red-cell standards from 0·25% to 0·87%. The period of sedimentation was increased from 60 to 75 minutes. As many different batches of fowl red cells as possible were employed during the tests in order to minimise in the final results, the influence of individual fowl cells, which had been found to have an effect on the actual inhibitory power of a serum against virus B but not against virus A. The simultaneous test of the two sera from each patient with the same reagents also reduced variation in the results from technical causes.

In each test standard sera were used—namely, a hyperimmune rabbit serum for B tests and two pools of human sera (1941) for A tests. In 22 out of 25 tests of the B serum against the homologous virus the readings were between 1/128 and 1/256: the other 3 were 1/64, 1/96 and 1/320. The 14 tests of the human pool sera versus A ranged from 1/64 to 1/160.

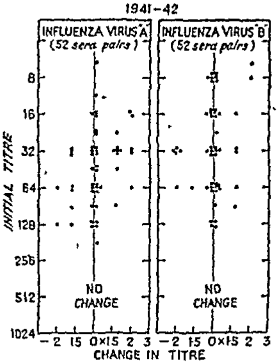

Fig. 1

Fig. 1 shows the results of the Hirst test on 52 pairs of sera from 1941–42, difference of titre of the two members of each pair being plotted against the titre of the first serum collected during the fever. Most of the pairs of sera showed no change in titre with either virus A or B; a few showed a decrease, and a few an increase in titre not exceeding 2-fold, against either virus. Hirst has stated that a 4-fold increase indica[illegible] with these se[illegible] [illegible] tests with vi[illegible] were also tested against virus A. Of these 114, 52 showed either no change, a decrease in titre, or an increase not exceeding 1½-fold; 12 showed a 2-fold or 3-fold increase, and 50 showed an increase 4-fold or greater. The sera of all 52 in the first category, of 11 in the second category, and 15 which exhibited 4-fold or greater increases to virus B, were tested against virus A. Only 2 pairs of sera exhibited differences in titre with virus A in excess of three times—namely, 4-fold and 5-fold increases; the majority showed no change, and the sera which were placed in various categories by the tests against virus B showed no such differences with virus A. These results were interpreted as indicating infection with influenza virus B in 50 patients.

Fig. 2 also shows th[illegible] vidual patients was [illegible] the serum, so that [illegible] antibody (8–32) more [illegible] than did those with h[illegible]

For 16 pairs of sera the results of the Hirst test were checked by neutralisation tests in mice; the sera included specimens in which the rise was considerable and others in which it was small. The results were plotted graphically as by Hirst (1942). Correlation was good, though not quite so close as in Hirst's results with influenza A virus; this is doubtless largely accounted for by the variable introduced into the tests with B virus by the unavoidable use of cells from different fowls.

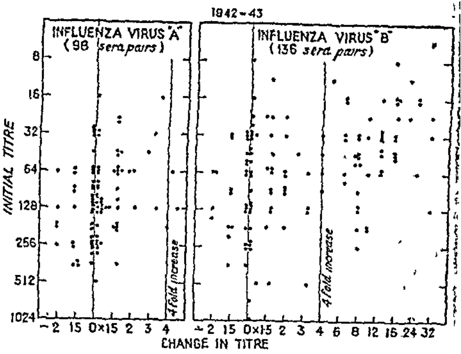

Fig. 2.

Towards the end of the normal influenza-season and after it, there were a number of small outbreaks apparently due to influenza A. Two of three sporadic cases of influenza arising towards the end of March in a single unit of division B showed increases of antibody to influenza A but not to B. This unit was disbanded five days later, so further observations were impossible. From a localised outbreak in East Anglia in March, 1943, ten sera were examined—2 pairs (acute and convalescent) and 6 single (convalescent) specimens. The paired sera showed in one case a definite (×8), in the other a doubtfully significant rise of titre against A, but none against B: one of the single specimens showed so high an anti-A titre (1/512) as to suggest a recent A infection. From an outbreak on an RAF station, also in East Anglia, in May, 1943, 7 pairs of sera were obtained; none showed any rise against B but 4 showed a rise against virus A (×6 to ×16). Finally pairs of sera from a local outbreak in Scotland in June, 1943, showed in 4 instances a significant rise and in 2 a trivial (×2 to ×3) rise against virus A; again there was no evidence of B infection.

Attempts were made to recover, by means of eg inoculations, strains of influenza virus from the ga glings of patients who did, or did not, show increas in B antibody as a result of their infection. Garglin were not available from the cases of influenza but those from 21 cases were tested, of which 11 wer from patients diagnosed as influenza B on serologic grounds. The garglings were filtered and inoculate amniotically into 12-day chick embryos, and passag from chick to chick was carried out 1–14 (usually 3) times No virus was recovered by this procedure; the extra embryonic fluids of the inoculated eggs never acquire the power to agglutinate fowl red cells, nor did the (11 samples) produce lesions in mouse lungs, even o passage, or (6 samples) infect ferrets.

Ferrets.—Garglings from 26 patients were inoculated into ferrets between January and April, 1943. Of these 7 came from the military [illegible] the Eastern counties and [illegible] if circumstances did not [illegible] they were stored in CO_2 [illegible] days.

The garglings were administered intranasally to ferrets in the usual manner under ether anæsthesia. The results were at first sight completely negative since no recognisable clinical symptoms with typical fever were detected. As the number of ferrets was insufficient to permit "blind" seria[illegible] years, we decided to [illegible] "convalescent" ferre[illegible] against either A or B virus had developed.

The general plan was to inoculate two ferrets with the original material. One of the pair was killed at the 4th or 5th day and a centrifuged suspension of lung and turb[illegible] in 10% serum broth was frozen in CO_2 alcohol. The ferret was bled about 14 days after inoculation and t tested against both A and B viruses. Preinoculation bleedings were taken in some but not in all of the ferrets. The inhibitory action of normal ferret serum varies according to the particular sample or pool of fowl red cells which is being used. Preliminary tests have indicated that the inhibitory titre of normal serum usually ranged from 1/32 to 1/128 but that occasionally readings as high as 1/142 to 1/256 are encountered. Antibodies against A or B virus were judged to have developed if the titres of the serum 14 days after inoculation was above the upper level of the normal range. If the serum of the second ferret showed a high antibody level, the stored material from the first ferret was passed to two more animals.

Of the 27 samples thus tested, 3 provoked a rise in temperature to over 104° C in one of the original pair, but it is doubtful if the reactions were specific for influenza since passage of suitable material failed to induce a febrile response. Recognisable symptoms were absent in all ferrets inoculated with original garglings and in those in the passage series. No gross changes were found post mortem: sometimes the turbinates were slightly congested and moister than normal, but no increase in the turbinate reaction was observed on passage to other ferrets.

In 19 instances the sample of convalescent serum from the ferret inoculated with the original material failed to show any appreciable increase in A or B antibody, but in the remaining 8 there was a 4–16-fold increase in antibody against B virus, (2, ×4; 1, ×6; 2, ×8; 1, ×12; 2, ×16). In passage ferrets, a significant rise in antibody was detected in animals after 1, 1, 2, 2, 2, 3, 3 and 6 passages respectively. The specificity of the antibody in the ferret sera was confirmed in 5 instances by neutralisation tests in mice, in which suitable serial dilutions of ferret serum were mixed with mouse-lung filtrate (B. virus, Lee strain).

We gained the impression from these studies that a virus serologically indistinguishable from B was being transmitted through the ferret. It was insufficiently active to provoke a febrile response or to establish clinical symptoms, but was capable of stimulating antibody production. Dr. Himmelweit (1943) was more successful than we were; he passed a strain through ferrets, and after 15 passages induced it to infect chick embryos. He kindly sent us some of his material which we found to be influenza B by the Hirst test.

The two samples from the Eastern Counties did not infect ferrets, and tests of their sera were negative although an appreciable rise in A antibody in the convalescent sera from these patients was detected by the Hirst test.

The table summarises the results of the serological tests in 1942–43, showing the proportion which gave positive results amongst (*a*) the human sera, (*b*) the ferret sera. It will be seen that comparison between sera from human cases and sera from ferrets inoculated with the corresponding garglings was possible in 21 instances. In 7, human and ferret sera were negative; in 6, both were positive; in the remaining 8, the human sera were positive, the ferret sample negative.

REACTION TO HIRST TEST (B VIRUS)

Garglings tested	SERA			
	Human + Ferret +	Human − Ferret −	Human + Ferret −	Human − Ferret +
21	6	7	8	0

Suspensions of ferret turbinates and lungs from the most promising cases were inoculated intranasally into mice without result. In 2 instances the tissues from ferrets inoculated with garglings were used, while the third-pass material was used in one case and the fifth-pass in another. Two of these strains were passed six times, one three times, and one twice, through mice in series, but no evidence of B infection was detected although in one instance the survivors from a group inoculated primarily with ferret tissue were subsequently proved to be immune to B virus.

In general the results, though disappointing, confirm the serological results on the human patients, and they emphasise the great difficulty in establishing strains of influenza B in animals. The lack of infectivity of filtered garglings for the chick embryo is not altogether surprising in view of the low percentage of positive results obtained in this country in 1941 with garglings from cases of influenza A.

DISCUSSION

Recent serological tests (Lush, Stuart-Harris and Andrewes 1941) showed that a considerable proportion of cases of influenza towards the end of the 1939 season were due to B virus. This was the first record of the existence of this strain in the British Isles. In 1940–41 there were mild epidemics, some of which were due to A virus (Andrewes et al. 1941), but no evidence of B virus was found. During the early months of 1942 there were no widespread epidemics, no viruses pathogenic for ferrets were isolated, and no serological evidence of antibody rises against viruses A or B was obtained. Towards the end of the year, however, and again in January and February, 1943, a mild increase of acute respiratory infections, with a small peak in January, was associated with serological evidence of influenza virus B infection. The illnesses were clinically typical of influenza, but some other respiratory infection which did not evoke serological changes for known influenza viruses was prevalent at the same time; many of these cases were afebrile, but some were febrile and could not be differentiated clinically from influenza B. Subsequently (March to June) the type changed and several minor outbreaks of influenza A infection developed in different parts of the country. They remained localised, however, and although occurring in widely separate areas, showed no tendency at this time to assume epidemic proportions.

There is some similarity in the epidemiology of influenza in this country in recent years and in the Argentine during 1940–42.

Taylor, Parodi, Fernandez and Chialvo (1942) report that in 1940–41, 22 human sera out of 26 showed neutralising antibodies to A virus, 1 to B and 1 to both A and B. After the epidemic had passed, 3 persons showed a rise to B only, but probably a mild B attack was in progress since later in the year a number of sera showed high antibodies to both A and B.

In 1941–42 both influenza virus B and cases of undetermined ætiology were encountered. They were generally mild and gave rise to few complications. No evidence of influenza A virus infection was obtained. Taylor et al. remark on the relative ease with which strains of virus were isolated from throat washings taken during 1940 and transmitted to ferrets, in contrast with the general failure of similar efforts with 1941 material.

The Hirst technique is exceedingly valuable in detecting virus B outbreaks, provided the factors causing variation in the inhibition titres of any particular serum are fully recognised and suitable precautions are taken against false readings (Stuart-Harris 1943). Like Taylor et al., we have found it useful to instil garglings into ferrets and examine the serum by the Hirst technique for antibody rise. In a proportion of cases in which the convalescent serum of the human patient showed a significant rise against virus B, the ferret serum was also positive. Serial passages through ferrets may also induce a rise in antibody although no overt symptoms of infection can be recognised. So far we have not isolated a B strain from garglings, either by ferret or mouse passage experiments or by the inoculation of the amniotic or allantoic cavities of developing eggs. Himmelweit (1943), however, has isolated from a fatal case of influenzal pneumonia a strain which closely resembles, though it is not identical with, the B strain (Lee), and he succeeded in infecting ferrets and chick embryos.

Taylor shows that in the Argentine a relatively widespread epidemic of influenza A—explosive in character but disappearing quite rapidly—was associated with or followed by an influenza B outbreak. In the following year sporadic influenza with no peaking was apparently due to influenza B and to an unidentified agent. In this country the reverse appears to have happened: a mild epidemic caused by B virus in association with unknown agents was followed by outbreaks due to A virus. At the time of these observations (June, 1943) the question suggested itself, "Will the change in type result in a widespread epidemic?" At first there was no apparent increase in the distribution and severity of outbreaks, but since November, 1943, influenza has appeared in epidemic form and preliminary tests at the National Institute for Medical Research have shown that A virus is the predominant type.

SUMMARY

1. *Early in 1942 examination of convalescent sera by the Hirst technique, and transmission of garglings to ferrets and developing eggs, failed to reveal any evidence that the mild influenza outbreaks then occurring were due t*[illegible]

2. [illegible] ute respiratory [illegible] with serologic[illegible] ion. Later in th[illegible] l outbreaks of A virus infection were encountered.

3. The value and the limitations of the Hirst test are discussed.

We extend our grateful thanks to numerous doctors, both Service and civilian, and especially to the 1st Medical General Laboratory, APO 519, US Army, for unfailing help in facilitating this investigation. We are especially indebted to Dr. C. H. Andrewes, FRS, for advice and assistance in preparing our report.

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R. J.

INFLUENZA VIRUS B

ISOLATED FROM A FATAL CASE OF PNEUMONIA

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SINCE the first isolation of a virus from patients suffering from epidemic influenza by Smith, Andrewes and Laidlaw (1933) it has been shown that at least two distinct antigenic types of influenza virus exist. Francis (1940) and Magill (1940) discovered in America strains [illegible] virus B. They have no [illegible] or to others [illegible] as influenza virus A.

Serological evidence of virus B infections in this country [illegible] Lush, Stuart-Harris and Andrewe[illegible] Glover and Mills (1942) [illegible] from garglings of [illegible] have, however, hitherto proved ineffective. [illegible] the kindness of Prof. W. D. Newcomb, to whom [illegible] o indebted for a description of the post-mortem [illegible]. I have had access to a fatal case of influenza [illegible] which I recovered a virus closely related to the B strain (Lee) isolated by Francis.

CASE-HISTORY AND POST-MORTEM FINDINGS

The patient, a man aged 55, fell ill on Feb. 8, 1943, and thought he had influenza. Next day he was much worse, with precordial pain and pyrexia, and in the [illegible] (about ½ pint). He became [illegible] was admitted to St. [illegible] died before being [illegible] ed The following were the findings [illegible]. 11:—

[illegible] *n.*—Dark altered blood exuded from the nose. The larynx and trachea were rough and reddened; thin, grey, *friable membrane* in patches on cartilages gave a banded appearance to the inner surface. There was much frothy bloodstained fluid in the trachea and bronchi. Both pleural cavities *also contained* bloodstained fluid. The lungs were dark and heavy; there was no fibrin on the surface, and they showed bloodstained œdema with patchy peribronchial consolidation.

Microscopically it was found that all the surface epithelium of the trachea was shed; there was little fibrin on the surface and there were masses of staphylococci, but few leucocytes. The epithelium of the bronchi was also shed. The lungs showed patchy bronchopneumonia, necrosis near brochioles, much hæmorrhage, and many staphylococci.

Other findings.—Cloudy swelling of myocardium, liver and kidneys; early septic spleen.

The important points are: (1) the enormous number of staphylococci, giving a heavy growth of *Staph. aureus* on culture from the lung; (2) the destruction of epithelium in trachea and bronchi; *and (3) necrosis*, hæmorrhage and little active reaction in lungs.

ISOLATION OF VIRUS

Eighteen hours after the patient's death a bacteria-free filtrate of lung tissue was prepared for inoculation of a ferret and mice.

Preparation of filtrate.—The current method of obtaining virus filtrates involves clarification of a tissue suspension through paper and asbestos pulp (Elford 1938). A method developed during the past year makes it possible to dispense with this initial clarification with consequent saving of time and labour.

After the us[illegible] 3000 rev./min. f[illegible] through three [illegible] membranes, which were *prepared in this department, had an* average pore diameter (APD) of 1·6μ 1·05μ and 0·7μ; they were so arranged that the suspension had to pass first through *the membrane with the largest APD and last through the one* with the smallest APD. The membranes thus act in succession as traps for particles of decreasing size, and each membrane holds back particles which would tend to block the pores of the next one. The membrane of 0·7μ APD retains bacteria.

By this method the volume of filtrate per unit area of membrane is about half that obtained by the method involving preliminary clarification. On the other hand, it is found possible to use tissue concentrates (*e.g.*, lung emulsions from mice infected with influenza virus) up to 20% compared with the 5% used in the current method. The yield of such filtrates is comparatively smalle[illegible] but their potency measured by the 50% end-point calcu[illegible] lation method of Reed and Muench (1938) is two or thre[illegible] times that normally obtained.

This method was used for the preparation of a filtrat[illegible] from a 20% suspension of lung tissue from the cas[illegible] described above.

Inoculation of ferrets.—The filtrate (1·0 c.cm.) wa[illegible] passed to a ferret in the usual way and a slight rise o[illegible] temperature (*103° F.*) was observed after 88 hours. The animal was listless, but no other signs were observed. On post-mortem examination nothing abnormal wa[illegible] seen.

A filtrate from a 1[illegible] -binates, prepared by the meth[illegible] used t[illegible] a second ferret four [illegible] ulation. The temperature rose [illegible] urs. A third ferret similarly [illegible] of the turbinates of the second ferret produced a temperature of 103° F. after 64 hours and in this animal congestion of the turbinates and a slight livid discoloration of one lung lobe was seen. Subsequent passages were made to 21 ferrets in all, at intervals of three to four days, involving 19 regular passages. The 17th and 18th passages were done in duplicate; 1 ferret of each of these two passages was bled af[illegible] the others were killed o[illegible] the 4th ferret passage [illegible] of the turbinates and more or less extensive livid areas on the lungs; all reached their maximum temperature [illegible]. Ferrets 7, 8 and 21 showed [illegible] F. and 105° F. Most of the [illegible], listless and eating little; 5 had wet noses and sneezed. In general these effects were similar to those observed by Francis in ferrets inoculated with influenza virus B.

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1. T[illegible] of the ferret is about 102° F. Owing [illegible] seen with these [illegible] consider readings [illegible] ing, the tempera- [illegible] taken daily for a [illegible] for [illegible] of a [illegible] tube.

Inoculation of chick embryos.—Attempts to infect chick embryos were made first from the filtrate prepared from the turbinates of the 12th ferret, [illegible], were available before this. Neither this filtrate nor one prepared from ferret 14 proved successful. From the 15th ferret, however, it was found possible to transfer the virus to chick embryos. The inoculation in every case was done by the amniotic route and the embryos incubated at 35° C. (Burnet 1941). The first pass to two embryos did not result in any obvious infection, but passes from these to two further embryos produced a positive result. The allantoic fluid of these embryos agglutinated chick cells (Hirst 1941). From this fluid a further 27 passes were made and there was a demonstrable increase in the infective titre of the allantoic fluid. This reached a maximum at the 15th passage, a dilution of 10^{-8} killing the embryo within 48 hours and a dilution of 10^{-9} showing that virus was present by a positive Hirst test. From the 6th passage onwards, inoculations were made into the allantoic cavity instead of the amnion. Discrete lesions were first observed on the considerably thickened chorio-allantoic membranes of the 10th passage embryos.

Inoculation of mice.—Many attempts were made to infect mice with the virus. Filtrates from the human lung and from the turbinates and from the lungs of 19 ferrets and allantoic fluid of 6 infected chick embryos were used. These inoculations did not produce lung lesions in any of the mice, nor were such lesions produced by further passages from these mice. Serial passes were made in different experiments through 5, 6, and 8 mice.

Serological investigations.—Sera obtained from 2 ferrets inoculated in parallel with the 17th and 18th passage ferrets were tested against the new virus strain, using allantoic fluid, and against egg-adapted influenza virus A (PR8) and influenza virus B (Lee) strains. Using Hirst's technique (1942), it was found that these sera inhibited to a high titre the agglutination of fowl erythrocytes by the new virus strain and by the virus B strain, whilst no effect was observed on the agglutinating power of the virus A strain. A PR8 ferret immune serum, on the other hand, tested against the new strain, proved ineffective. Lack of a virus B immune serum prevented a further test for a more detailed identification. The conclusion seemed justified, however, that the new virus strain, which may conveniently be called the "Paddington strain," was definitely not an A strain, but most probably related to the B type.

Dr. C. H. Andrewes and Miss K. Mills kindly confirmed the above findings and their serological investigations showed that this virus strain closely resembles the virus B strain (Lee). Samples of convalescent ferret sera and human sera obtained in 1943 showed slightly greater antibody rises against the Paddington strain than against the Lee strain of influenza B.

DISCUSSION

The difficulties experienced in recent years in isolating influenza virus B strains in this country are probably due to their low virulence. The fact that an influenza B strain has been isolated from a fatal case does not necessarily prove its special virulence. It is very likely that the rapid fatal issue was due to toxæmia resulting from the heavy infection with *Staph. aureus*, the patient having had probably very little resistance against this organism. The association of influenza virus with *Staph. aureus* in a rapidly fatal case of influenzal pneumonia recalls the observations of Andrewes, Smith and Stuart-Harris (1937) that "when *Staph. aureus* is a secondary invader, death is apt to occur more quickly."

Serologically, the new B strain closely resembles the B (Lee) strain. But its high virulence for chick embryos and its reluctance to infect mice are distinguishing features.

SUMMARY

The isolation of an influenza virus B strain from a fatal case of influenzal pneumonia is described. By *a modified method of filtration through 'Gradocol'* membranes a highly potent filtrate of lung-tissue suspension was prepared. This was found capable of infecting ferrets and subsequently chick embryos. [illegible] to infect mice failed.

This strain resembles closely, but is not identical with, the B strain (Lee) described by Francis.

I should like to thank Prof. W. D. Newcomb, FRCP, for drawing my attention to this case, and Dr. C. H. Andrewes, FRS, for his constant interest and advice.

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BLOODLESS TONSILLECTOMY UNDER LOCAL ANÆSTHESIA

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MAJOR RAMC; ENT SPECIALIST

In America and on the Continent the use of general anæsthesia in tonsillectomy has not found much favour. The reason for this is not—as is sometimes thought—a lack of skill on the part of the anæsthetist, but because it is believed that local anæsthesia has very definite advantages. Since my postgraduate days in Vienna I have performed more than 2300 tonsillectomies under local anæsthesia, and, with my present technique, claim that 90% of the operations are completely bloodless, while in the remaining 10% there is rarely more than an eggcupful of blood lost.

The essential principle of this operation is the injection of a very large quantity of 'Novutox'[1] (this proprietary preparation of procaine already contains a small amount of adrenaline) into the so-called tonsillar capsule, which acts in three ways. First, the anæsthetic properties are so great that the patient experiences no pain at all; secondly, it acts as a perfect hæmostatic; and thirdly, by its quantity alone, it forces the tonsil from its bed, forming an intervening layer of œdematous tissue.

It is claimed that by this method there is no pain whatever during the operation, and the after-pain is always much less than when a general anæsthetic has been used; the general recovery is much quicker; and the total operation time is only about 10 minutes. (With a trained team in the theatre it has recently been possible to complete seven tonsillectomies in 70 minutes.)

DETAILS OF TECHNIQUE

Preparation of patient.—About forty-five minutes before the operation the patient is given morphine gr. ¼ and atropine gr. 1/100. Ten minutes before, while the patient is still in his room, the throat is sprayed by an assistant with equal parts of 10% cocaine and adrenaline 1/1000. (When he comes to the operating theatre, the patient may complain of a lump in the throat and that he cannot swallow properly, but this is the maximum discomfort he is likely to feel.)

Injection.—With the patient seated on an ordinary chair, facing the operator, who sits on a slightly higher level, the throat is now injected. As this is the most important part of the whole operation, the operator should wear a powerful and properly focused headlight. A suitable syringe and needles should be used. A 20 c.cm. Record syringe with movable thumb and finger rings is best, for the point of the needle may then be turned in any direction without alteration of grip. The needles should be reinforced, about 5 in. long, and curved almost to a right angle at the tip, and they should

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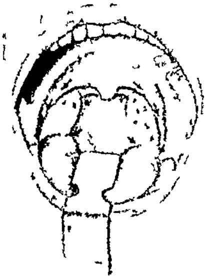
[1] Novutox and procaine are sometimes thought to be synonymous. On three separate occasions, when at operation there was slight pain and slight bleeding, it was subsequently discovered that the dispenser had used procaine instead of novutox, thinking that there was no difference, and that therefore no explanation was necessary. Novutox is procaine hydrochloride containing 0 000 02 g. epinephrine per c.cm. in Ringer's solution with an addition of quinine derivatives and thymol to make it self-sterilising. Procaine is described in the *BP* as a "Local anæsthetic which when injected has a rapid action and is moderately powerful, but somewhat transitory. To obtain a prolonged and intense anæsthetic effect it is therefore usual to add a small proportion of adrenaline, with the object of delaying dispersion from the site of injection."



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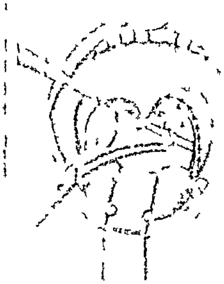

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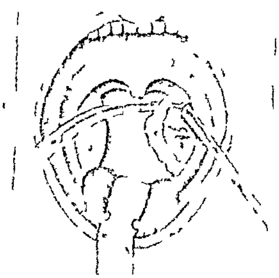

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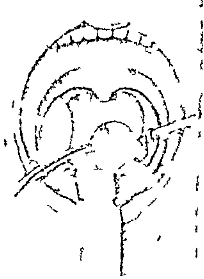

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Fig 1—The arrows show the direction of the needle for the injections of local anæsthetic.

Fig 2—With traction on the tonsil the incision is made from below upwards and sweeps around the upper pole and down the free edge of the posterior pillar as indicated by arrows

Fig 3—The œdematous tissue behind the tonsil is broken down by blunt dissection the upper pole being freed first

Fig 4—The tonsil now remains attached only by a pedicle The snare is then tightened over the pedicle and the tonsil thus completely enucleated

have some locking device on the tip of the syringe (Galbraith's hæmorrhoidal needle is suitable)

Five injections, each of 5 c cm of ½% novutox, are made into each tonsil area, in this low dilution 50 c cm is quite harmless The first injection is made at the top of the anterior pillar, about 1 cm from the margin with the tip of the needle pointing downwards and slightly outwards The second is made in the middle of the pillar, 1 cm from the free border, with the needle pointing directly downwards The third, and most important is made at the junction of the anterior pillar and base of the tongue, the needle point being directed downwards and inwards For the fourth injection the point of the needle is inserted behind the posterior pillar as high as possible and in an upward direction, the syringe being drawn over into the opposite angle of the mouth The fifth injection is made behind the posterior pillar as low as possible, the point of the needle being directed downwards and outwards, with the syringe drawn well over into the angle of the mouth (fig. 1)

When the injection of both tonsils has been completed there will be considerable local swelling due to the injected fluid The patient should wait for not less than ten minutes before the dissection is begun, so that absorption may properly take place

Operation—The patient is brought back to his chair and a sterile towel is fastened around his neck, with another over his head which covers his eyes He sits with his chair drawn well forward, close to the operator's stool, one hand being placed on each of the operator's knees An assistant standing behind the patient's chair steadies the head in his two hands, turning it gently to right or left as the surgeon may desire

Throughout the operation it is desirable to keep up a stream of reassuring or even impersonal conversation This may seem a trivial point, but it does help to keep the patient's attention distracted, and is always appreciated In Vienna this is called 'vocal anæsthesia'

No gag is necessary The patient is asked to open his mouth, and the tonsil behind the œdematous anterior pillar is gripped by the volsellum A tongue depressor may be used in the left hand for this procedure, but afterwards this may be discarded, for the tongue is easily controlled by the depressed volsellum

Exerting slight traction on the volsellum, an incision is now made along the free margin of the anterior pillar from below upwards This sweeps around the upper pole of the [illegible]

and easily wiped away from the tonsil and, as traction is exerted on it, the stripping down proceeds until the tonsil is attached o [illegible] (fig [illegible]) This stripping m [illegible] instrument with [illegible] ee may be used in [illegible] sil from its bed without hurting the patient The tonsil must be entirely free, except for its attachment by the lingual prolongation, before its removal is attempted It is especially important to see that it has been completely separated from the anterior pillar at its lower extremity in order to avoid damage to the pillar

The snare may now be slipped over the handle of the volsellum, and, by a series of light shaking movements, forced down to the base of the lingual prolongation Here it may be tightened until it cuts through (fig 4) The tonsillar fossa will now be found to be absolutely smooth and clean, with both pillars free and intact

Though there will have been no bleeding, I pack the fossa with a wad of moistened wool well wrung out before proceeding with the next tonsil When the wool is removed at the end of the operation the fossa should be quite dry If there should be an oozing point it can be controlled by the application of artery forceps for two minutes

The total time occupied in the removal of both tonsils seldom exceeds three minutes Should there be two or more tonsillectomies on the operation list, it saves a considerable amount of time if the injections are given immediately one after the other, the first dissection being started after the last injection With two sets of instruments it should be possible to complete five to six cases in an hour

Postoperative period—The patient is allowed to sit out of bed on the evening of the third day, and is sent home on the fifth or sixth day He should be able to resume his normal life within a fortnight of the operation

COMMENTS

It may be argued by or for the patient that the idea

ment after the operation that 'It didn't hurt a bit," or "It hurt far less than having a tooth removed", and if not actually volunteered this will be readily admitted when asked I have never seen any complications from the injection of this large quantity of local anæsthetic

It has not been found necessary to ligature a vessel, for should there be any oozing this can be effectively controlled either by the temporary application of an artery forceps or by inserting a cotton wool plug wrung out dry in turpentine Bleeding after the patient is back in bed is due either to an incomplete dissection or to having allowed the patient to leave the theatre while there was still a slight ooze from the tonsillar fossa Secondary hæmorrhage is very uncommon

A history of repeated quinsies is no contra indication to the method described—in fact the method is particularly suited to such cases Naturally the dissection is made a little more difficult by past quinsies, but [illegible] so much so as with general anæsthesia. The method is not advised for patients below the age of 17 or 18.

SUMMARY

Tonsillectomy under local anæsthesia as described is painless, usually bloodless, and is far quicker and simpler to perform than tonsillectomy under general anæsthesia, and the time of recovery is shorter.

PRIMARY PULMONARY TUBERCULOSIS

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PRIMARY tuberculous infection arises most often in the lung. Any lobe may be involved and the site of the focus is usually near the periphery. The first reaction of tissue to the tubercle bacillus is an exudative inflammatory one with outpouring of neutrophils and serum; later, the reaction becomes proliferative with mobilisation of monocytes, macrophages and lymphocytes. Caseation takes place in the centre, the surrounding exudate is largely absorbed and a capsule forms around the focus. The caseous centre becomes inspissated and calcified and eventually may become ossified. Similar changes occur in the lymph-glands which drain the area of lung infected, and a lymphohæmatogenous dissemination of bacilli takes place in most if not all cases. About six weeks from the beginning of infection the infected person becomes sensitive to tuberculin.[1]

The chief distinctions between primary tuberculous infection and postprimary or secondary forms of tuberculosis are as follows. Primary infection develops in those who previously have not been sensitive to tuberculin, secondary infection in those who are already sensitive to tuberculin. Primary infection may appear in any part of the lung; secondary infection usually starts in the upper third of the lung. The tracheobronchial lymph-glands become infected and enlarged in primary infection, whereas the draining lymph-glands seldom become involved in secondary infection. The caseous area in primary infection usually becomes encapsulated and calcified; in secondary infection caseous areas usually proceed to liquefaction and cavitation. Hæmatogenous dissemination, not clinically evident at the time, takes place in most cases of primary infection; in secondary infection the lesion tends to spread by infiltration and by the bronchi.

The primary focus in the lung may become completely healed in the course of time, biologically as well as anatomically, leaving behind a small scar or a calcified nodule. Though encapsulation and calcification also occur in the neighbouring lymph-glands there usually remains some caseous material within the capsule and here live bacilli may persist indefinitely. Towards the lung apices and in other organs there likewise often persist small areas of encapsulated foci of tuberculosis derived from the previous dissemination. The patient who recovers from primary infection—and most patients do recover—has become sensitive to tuberculin and has become a host to the tubercle bacillus. Should he again succumb to infection, from an exogenous or endogenous source, his tuberculosis will be of a secondary type and of a more serious form.

It has commonly been claimed that primary tuberculosis, contracted in childhood, provides an immunising protection against later infection. Experiments on guineapigs and other animals have been quoted to support this claim. This experimental work may be summed up briefly. Two groups of guineapigs, one group previously injected with a comparatively mild dose of bacilli, are injected with a strong dose of bacilli. The members of the group previously infected survive longer than the members of the other group. They do not continue to live and thrive; like the second group they also die from tuberculosis but they take a little longer to do so. This longer survival is often alluded to in terms of immunity.

All patients with phthisis have previously had a primary infection.

Side by side with the idea that infection at an early age is of protective value, there exists a belief that tuberculosis in young children is frequently fatal. Extensive tuberculin testing in the last thirty years has done much to disprove this belief. Drolet (1934) estimated there were 5000 cases of tuberculous infection among infants under one year in New York in 1930; 75 died. Armand-Delille (1927) was inclined to consider pulmonary tuberculosis in infants as nearly always curable. Krause (1926, 1928) often drew attention to the resistance of infants to tuberculosis and expressed the view that only 1 out of 65 infected infants died from the disease. Myers (1935, 1938) has repeatedly observed that infants and children tolerate well the first infection type of tuberculosis. Continuous exposure to heavy dosage of bacilli occasionally results in overcoming resistance, progression of the primary lesion and culmination in acute miliary tuberculosis. These are the cases that attract medical attention. Primary infection, in children and in adults, is usually overlooked.

SYMPTOMS AND SIGNS

With the onset of tuberculin sensitivity, symptoms appear. As a rule the symptoms are mild—sometimes so mild that the primary phase is passed through without the person seeming ill. The chief symptoms are slight pain in the chest, fever to about 101°F., fretfulness in children, lassitude in adults. Children fail to gain weight for a while.

Seldom are there any physical signs to indicate the presence of pulmonary disease. There is an increase of the sedimentation-rate and commonly a slight leucocytosis. In most cases a chest X-ray film demonstrates the shadows of a primary complex. The two component shadows of the primary complex, so-called after Ranke, consist of a peripheral pneumonic one and a perihilar one. The peripheral shadow varies in size from a barely discernible area of shading to one involving most of a lobe. The perihilar shadow is usually the larger of these two shadows and persists longer. There appears to be a difference of opinion regarding the frequency with which these shadows can be demonstrated on an X-ray film. From personal experience of tuberculin testing and of X-raying recent reactors over a period of years I believe that shadows suggestive of a primary complex may be demonstrated in most cases of recent infection. The frequency with which pulmonary and perihilar shadows can be seen in the chest films of patients with erythema nodosum supports this belief, for erythema nodosum, though not a specific reaction, being occasionally seen in other infections, in the majority of cases in European countries is associated with a recent primary infection. For more extensive evidence regarding the ætiology of erythema nodosum I refer the reader to Wallgren (1939) and other Scandinavian writers. When the primary infection lesions have subsided and become encapsulated, only in a minority of cases are the shadows demonstrable on an X-ray film.

Patients with a primary tuberculous infection seldom raise sputum for examination; whatever sputum they may be is usually swallowed. Smear and concentration examination of sputum-cup contents seldom yields positive results. To demonstrate the tubercle bacillus in these cases it is advisable to perform gastric lavage and to culture, or guineapig inoculate, the centrifuged residue of fasting gastric fluid. Attempting to obtain sputum with a pharyngeal swab is not reliable. It is well to repeat the gastric lavage a couple of times. The more assiduous the search for bacilli the higher will be the percentage of positive results.

TREATMENT

The first and most important procedure in the treatment of primary tuberculosis is to separate the patient from the source of infection and thus to protect him from continuous dosage with bacilli. Some of the Scandinavian writers have maintained that the dosage is of little importance—that a few bacilli may be as fatal as many. Results of contact examinations and of attempts to locate sources of infection do not support this view. It is seldom difficult to trace the source of infection when the patient is a child with a progressive primary lesion or with miliary tuberculosis, but to trace it when the patient is a child with a non-progressive type of primary infection is often difficult and sometimes unsuccessful. In the former instance the source is invariably found in the child's home; in the latter the source is commonly outside the home. Infants, children and adults all have a considerable resistance to primary tuberculous infection; otherwise few would survive infection. Massive infection may overcome that resistance. Lurie (1941), in his important work on inherited constitutional resistance in rabbits, has shown that the greater relative resistance exhibited by some strains can be overcome by massive infection, and that under [illegible] *and animal experiment appear to correspond.*

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[1] Lack of space forbids a review of the work of Parrot (1876), Kuss (1898), Ghon (1916), Ranke and others whose names are associated with the study of primary infection.

Rest is the next most important item in the treatment of these patients. *Six to eight weeks' rest is likely to* give sufficient time for the lesions to become encapsulated. Most patients recover undiagnosed and untreated, anyway. Making the correct diagnosis is important, however, apart from satisfying one's urge to find the right answer, for it often puts us on the track of a source of infection. A sanatorium seems to be the least advisable place to send a patient with a primary infection. These patients should be protected from further exogenous infection, and a stay in a tuberculosis sanatorium, especially in these days of scarcity of beds, is not likely to achieve that object. They may be allowed to rest in their own homes, but observation can best be carried out in a general hospital. Being usually non-coughers and non-sputum-raisers they are not likely to *spread infection.*

DISTRIBUTION

With the decline of tuberculosis from the beginning of the present century until recently, a decline interrupted *during the last war, it was to be expected that an* increasing number of persons would escape infection *during childhood and that primary tuberculosis would* be found more frequently in adults. Extensive Mantoux testing in recent years in the United States, France and Germany showed a high proportion of young adults to be non-reactors to tuberculin. Long and Seibert (1937) found that the majority of students entering universities in the western states of America in 1935 and 1936 were Mantoux negative. [illegible] about 50% of German army [illegible] negative. Meersseman (1937) [illegible] ion in the French army, and has repeatedly commented on the frequency, the mildness *of symptoms and the scarcity* of fatal results of primary infection among recruits in *the French army. Since there are few published figures* it is difficult to estimate what percentage of young adults in this country are non-reactors but it may be assumed that primary tuberculosis is no longer confined to children. There appears to be no difference between primary tuberculous infection in the child and in the adult. Sweany (1941), who has done much work on the pathology of primary foci, says there is no essential difference due to age. Myers (1938) thinks that the belief in rapidly progressive *disease in adults not* previously infected is a myth.

During the last year ten cases of primary pulmonary tuberculosis were diagnosed in the adult medical wards of Stoke Mandeville Hospital. Three of the patients were under 20 years of age; the other seven were between 20 and 28. With the exception of two patients who developed a pleural effusion a couple of weeks after onset of illness the symptoms were mild and of short duration. Of the two patients with pleural *effusion,* one had a bilateral effusion, the other a contralateral effusion. These two cases afford clinical evidence of hæmatogenous dissemination of bacilli. The effusions [illegible] rapidly after rest and aspiration of fluid. [illegible]

primary complex. In only one case [illegible] obtained by the usual routine method, positive for the tubercle bacillus. In six cases, tubercle bacilli of human [illegible] by gastric lavage and *culture* [illegible] To obviate any possible doubt [illegible] of bacilli thus demonstrated guineapigs were inoculated in two cases. The guineapigs on autopsy showed active tuberculous lesions. Three of the patients had erythema nodosum. Tubercle bacilli of human type were grown on medium after gastric lavage in each case of erythema nodosum. Where circumstances *permitted, follow-up gastric lavages and* cultures were performed after recovery, and arrangements were made for an *X-ray examination at intervals of* 3–6 months. Since nine of these patients came from places outside the jurisdiction *of the hospital the problem* of finding the sources of their infection devolved on others. The source of infection of the *tenth patient* was found and isolated.

SUMMARY

An account is given of primary pulmonary tuberculosis and how it differs from postprimary or secondary forms of the disease.

Emphasis is laid on the importance of gastric lavage followed by culture, or guineapig inoculation, as the most effective method of proving the ætiology.

Except when constantly exposed to heavy dosage, or under abnormal conditions, the symptoms are mild and death during the primary infection phase is comparatively rare.

Sanatorium care, on account of the short duration of illness and the danger of continued exogenous infection to the patient, is not advisable.

Ten cases of primary tuberculous infection in young adults are briefly reported.

My thanks are due to Dr. T. Prod Bennett for permission to report these cases and to Prof. J. McIntosh and the staff of the department of pathology for laboratory assistance. Acknowledgment is made to the Director-General of Medical Services, Ministry *of Pensions, for permission to publish this* paper.

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CARCINOMA OF THE ŒSOPHAGUS

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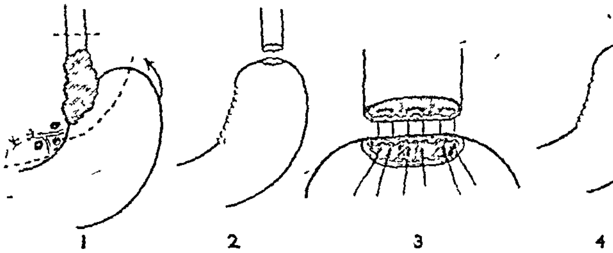
The following case seems to be the first recorded in this country of recovery from resection with anastomosis of a carcinoma of the œsophagus, although several cases have been reported from other countries.

CASE-HISTORY

A woman, aged 53, complained of dysphagia of three months' *duration;* latterly only *fluids and small quantities* of semi-solids had been swallowed. X rays showed a filling *defect* in the œsophagus 1½ in. above the diaphragm, and œsophagoscopy revealed a typical malignant ulcer at this level which, on biopsy, proved to be a squamous epithelioma. At a first operation on Feb. 1, 1943 *(local anæsthesia,* and gas and oxygen), a Kader-Senn gastrostomy was performed, the stomach being pulled *as far over to the left as* possible. At the same time the proximal end of the stomach was *investigated;* the growth was found to have extended ½ in. distal to the cardia and some mobile enlarged glands were present along the lesser curvature. At a second operation on Feb. 16 (avertin, and gas and oxygen), the thorax was opened through a long intercostal *incision* in the ninth space, extending from the *costal margin in front to the* transverse process of the vertebra behind; the lateral part of the erector spinæ *was divided,* as was the neck of the rib on each side of the incision to *facilitate retraction* phrenic nerve was crushed and the lower part of the lung freed by cutting the ligamentum latum pulmonis. The mediastinal pleura was incised and the œsophagus explored; the growth was found to be freely mobile and there were no obvious metastases in the mediastinum. The diaphragm was split from the œsophageal opening to the periphery—a finger in the hiatus helping greatly in its division—and the abdomen entered. The spleen got in the way, so it was removed, and the vessels along the left half of the greater curvature of the stomach were tied and cut. The coronary artery was divided between ligatures and the glands stripped from the lesser curvature towards the cardia, which was then freed from the medial part of the hiatus; the œsophagus was separated upwards for about 4 in., care being taken not to injure its blood-supply, the long lower œsophageal arteries from the aorta. The œsophagus, cardia, and stomach could now be delivered easily for resection, which was carried out between clamps placed well above and below the growth (fig. 1).

The anastomosis was performed on the lines suggested by Ogilvie,[1] depending on the observation that the fundus of the stomach can be pulled much higher into the chest than can the cardia, in fact as high as the neck of the fourth rib. The line of gastric resection was closed in two layers, the fundus was pulled up and clamped, and a fresh opening made into its highest part (fig. 2). The posterior suture line followed the procedure used by Grey Turner in performing Billroth I gastrectomy, where the posterior Lembert stitch is replaced by a line of three interrupted through-and-through mattress sutures piercing all the coats (fig. 3). When these are tied the posterior lips of the anastomosis are brought into beautiful apposition for the second continuous through-and-through stitch. The anterior part of the anastomosis was completed in two layers in the usual manner (fig. 4) and a few reinforcing sutures were added back and front. When the clamps were removed the œsophagus contracted like a concertina so that the suture line lay at the level of the arch of the aorta, but without any tension. Part of the opening in the diaphragm was closed and the rest sutured round the middle of the stomach so that an artificial diaphragmatic hernia was produced, and the chest wall closed in layers. A water-sealed drain was inserted in the pleura through a stab wound in the 11th space posteriorly. The operation proved relatively easy and was completed in 1 hour 40 min., during which time a pint of blood was administered by means of a continuous intravenous drip.



Stages of resection and anastomosis.

The specimen showed a malignant ulcer 2 in. × 1½ in., not extending completely round the œsophageal lumen, about three-quarters of it being in the œsophagus and the rest in the stomach; the glands contained macroscopic growth.

The patient was not very shocked, and next day was remarkably well. She was kept on gastrostomy fluids only for 24 hours, when she was allowed sips of water, and at the end of three days was drinking freely. She was swallowing semi-solids in ten days, and meat and vegetables in three weeks, when her gastrostomy tube was discarded. Convalescence was retarded only by a small loculated empyema which was drained by a separate intercostal catheter, and 3 oz. of pus were eventually coughed out of the original stab drain hole at the end of 6 weeks. She left hospital perfectly fit and swallowing well two months after operation; radiography showed uninterrupted passage of barium. At the end of five months patient was still in good health and swallowing without difficulty.

This fortunate result was due in large measure to the happy conjunction of an operable growth with a relatively young patient. Most carcinomas of the œsophagus occur in old men, and when they do not they are often inoperable by reason of fixity or metastasis. A really operable case will, however, occasionally be encountered; the radiotherapists claim that in this field they can beat the surgeons, but they have yet to show that they can successfully treat carcinoma which has entered the abdomen.

A pitfall might be quoted from a similar case operated on about a year ago. I thought to counter the danger of infection by performing the operation in two stages, and finished the first stage at the freeing of the parts; the fundus of the stomach was hitched up to the neck of the fourth rib by a stitch which unfortunately went too deep, penetrated the mucosa and cut out, and the patient died ten days later of a gastric perforation into the pleura.

I should like to record my debt to Prof. Grey Turner's work on œsophagectomy and Surgeon Rear-Admiral G. Gordon-Taylor's on thoraco-abdominal surgery; to Brigadier W. H. Ogilvie for suggesting the details of the operation; to Mr. Libero Fatti, of the Middlesex County Council, for coaching in thoracic surgery and assistance at the operation; and to Dr. Arnold Barnsley for a perfect anæsthetic.

Medical Societies

EUROPEAN ASSOCIATION OF CLINICAL PATHOLOGISTS

At the first general meeting held in London on Nov. 26 and 27, with Dr. S. C. **Dyke**, the president, in the chair, the association adopted a constitution and made plans for the establishment of local branches on the continent of Europe and for the interchange of workers in clinical pathology between laboratories in European countries after the war.

At the scientific meeting Dr. H. **Bab** (Berlin) discussed the clinical symptoms of *adrenocortical hypo- and hypertrophy*, and showed photographs of cases of dwarfism, gigantism and intersexuality caused by disturbances of the action of the adrenal cortex and illustrating the effects of preparations embodying its active principles.

Dr. M. **Mandelbaum** (Munich) described an *organism of the Neisseria group* isolated from mice, which within two hours of being brought into contact with high dilutions of any of the sulphonamide drugs showed characteristic morphological changes. Dr. Mandelbaum suggested the use of this organism for testing the therapeutic value of new sulphonamides.

Prof. S. **Jellinek** (Vienna) demonstrated that the reaction of the tissues to *electrical lesions* is entirely different from burns due to heat. Tissues affected by electricity show distortion, and though they may come to harbour micro-organisms they do not become truly septic. Professor Jellinek strongly deprecated the treatment of electrical lesions as true burns.

Dr. H. **Pollak** (Prague) recorded observations that the hippuric acid test showed a deterioration of liver function in patients with peptic ulceration and improvement in liver function after successful treatment of the gastric conditions. He pointed out that the test could give valuable information as to the fitness of the patient for surgery. Prof. M. **Reiss** (Prague) had found that the *shock* induced in rats by the intraperitoneal introduction of hypertonic glucose could be largely prevented or neutralised by the exhibition of corticotrophic hormone. Withdrawal of this hormone by ablation of the hypophysis rendered the animals more susceptible to shock. He suggested that shock could be more readily treated with corticotrophic hormone, which stimulated a whole series of hormonic responses, rather than with cortin or similar preparations of the adrenal cortex alone. Professor Reiss showed a hand hæmatocrit for field use, capable of being worked from any rapidly rotating wheel such as that of a jacked-up motor-car.

Dr. J. **Ungar** (Prague) discussed the principles underlying the testing of chemotherapeutic substances in vitro, in vivo and in tissue culture.

DEMONSTRATIONS

Dr. B. L. **Della Vida** (Rome) demonstrated crystals of the various types of drugs of the sulphanilamide group appearing in the urine of patients under treatment; Dr. **Elizabeth Delikat** (Bratislava) films and cultures from a case of acute and fulminating pulmonary aspergillosis; Dr. I. FRIEDMANN (Prague) the preparation and use of dried egg powder as a substitute for fresh eggs in the [illegible] of media for the cultivation of [illegible] Dr. F. PICK (Prague) micro- [illegible] the organs of a child showing [illegible] ions which had been variously [illegible] granuloma and a congenital

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[1] Ogilvie, W. H. *Brit. J. Surg.* 1938–39; 26, 10.

ROYAL SOCIETY OF MEDICINE

At a meeting of the Section of Psychiatry on Dec. 14, with Dr. W. NORWOOD EAST, the president, in the chair, Dr. JOSHUA BIERER discussed

A New Form of Group Psychotherapy

It has been asked, he said, why the di[illegible] psychotherapy have not been [illegible] mental hospital practice. Unt[illegible] no practical method of using the [illegible] feels, no longer holds good. Mind and body are one entity, and this entity is part of a larger entity—society. A man working in industry lacks the chance to develop initiative and responsibility. In the dissatisfaction of people [illegible] y years he sees a reaction not [illegible] but to psychological slavery. [illegible] social clubs, [illegible] four attached [illegible] hospitals. The clubs were started with three main ideas. First, it was felt that patients robbed of freedom might improve if they were given a temporary illusion of freedom in the club. Secondly, they might improve faster and relapse less readily if they were trained in hospital to mix with other people socially and encouraged to accept responsibility and use initiative. Thirdly, helpful situations might be contrived for them in the club. Patients dread the loss of freedom entailed in mental hospital care, especially since the period of imprisonment is indefinite. The possibility of being a voluntary patient is still little known. Clubs were started by gathering a few suitable patients together, putting the idea before them and asking them to develop it. They were ready to accept the responsibility and did not lack ideas. The first club began by meeting three times a week, but the war made it necessary to reduce the meetings to once a week. The club council meets separately once a week and there are occasional subsidiary meetings. It is run on democratic lines, a fresh group of officers being elected every three months; the chief officers are chairman, vice-chairman, secretary, and conveners of magazine, sports and house committees. The frequent changes of officers give more members a period of responsibility and a chance to use initiative. The council makes out the programme of meetings, considers suggestions and complaints of members, and organises extra events. Members of the hospital staff can attend the socials only by invitation from one of the patients, which helps the patients to feel that they have an opportunity to give instead of always receiving. Patients become eligible for the club on the recommendation of their doctor; they are introduced as guests by members, and are elected at the next general meeting. The first club [illegible] chronic patien[illegible] an average a[illegible] sexes; they r[illegible] as wide a difference in social and intellectual standards, which has not proved a drawback. They were suffering from schizophrenia, anxiety states, depression, neurasthenia, paranoia and so on. The meetings undertook community work, discussions and lectures, card-drives, dancing, sports and rambles, and preparation of food. The officers had training in the running of a second club for chronic patients.

Difficulties have of course to be overcome. The relationship between the doctor and the group inevitably differs from that between the doctor and an individual. Most psychotherapists, in Dr. Bierer's experience, are schizothyme rather than cyclothyme, and though they learn to overcome their shyness with individuals they may have difficulty in handling a group. The transference of a patient to his own psychotherapist may conflict with his transference to the psychotherapist guiding the club. The relationship of the patients to each other has happily been good, showing none of the gossip, jealousy and petty encounters found in clubs for normal people. In order to give patients a real sense of freedom of action any work done by the staff must be behind the scenes, and they must behave like ordinary club visitors. Starting with the belief that the patients must be trusted with as much freedom as possible they had to be prepared to take a certain amount of risk; but there have been no unpleasant incidents in 1 years, though in two cases couples who met at the club subsequently married. For many patients the experience and responsibility of serving on the council renewed self-confidence. A few months ago a second club was started for chronic and deteriorated patients; this is not yet self-governing. Meetings encourage collective activities, community singing, simple games and dancing. Ex-officers of the first club run it and it gives them joy to find they can provide something which their less fortunate fellows appreciate.

Outpatient clubs have been founded to help discharged patients to maintain the social adjustment begun in hospital, and possibly to reduce relapses. Nearly every patient in the outpatient department has difficulty in adopting himself socially, and many have no social life at all. To avoid stigma, clubs meet in buildings outside the hospital. Membership is not limited to patients; anyone who is properly introduced may become a member. Doctors take no office, but one is always present. Meetings are held weekly and the light expenses are met by the members. Clubs are now in action in East Ham and Southend (for Runwell and Southend General Hospital patients) and in connexion with Bart's and Guy's psychiatric outpatient departments. [illegible] the others [illegible] have prov[illegible] reason or another felt cut off from their fellows. Dr. Bierer feels that the clubs combat shyness, loneliness, general and social inferiority feelings, sexual maladjustment, lack of incentive and aim in life, inability to cooperate with others, claustrophobia and agarophobia, parental domination, acute disappointment and physical defects. He suggested that other mental hospitals and outpatient departments might organise such clubs. "By helping the patient to [illegible]" he concluded, "we destroy [illegible] begin rebuilding a healthy [illegible]

DISCUSSION

Dr. E. B. STRAUSS said that the Bart's outpatient club had proved a valuable auxiliary to treatment. He pointed out that Dr. Bierer saw the patient's problem in terms of frustration at the level of the herd or community instinct. At the bottom of most psychological maladjustment is lack of a sense of personal validity; and any interests which restored this sense are acceptable.

Dr. J. MAXWELL JONES asked whether any ordinary club in the district would not serve equally well.—Dr. T. P. REES endorsed the opportunity which a club gives for the sexes to meet and mix. There is too rigid a separation of the sexes, he considers, in most mental hospitals. They have a patients' club at Warlingham, though not, he admitted, run on the democratic lines advocated by Dr. Bierer. At one time the club-room was open all day, but it proved so popular that the patients went there when they should have been engaged in occupational therapy; so that it is now open only from noon till 7 P.M. He felt he would probably try out Dr. Bierer's methods.—Dr. M. B. BRODY spoke of the increased rapport established between doctor and patient, thanks to attendance at the club.

REPLY

In replying Dr. BIERER referred to mass psychotherapy, by suggestion; class psychotherapy, by lectures to a group; and group analysis, in which the problems of one member are analysed by another member of the group. Social clubs, he felt, offer a fourth type of [illegible] lub discussions, for example, [illegible] to talk about some problem [illegible] will do so without realising at the time that he is discussing his own probl[illegible] later he profits by the increased insight he from it. Again, situations can be contrived to break down self-doubt. Thus a girl who fancies herself unattractive will attend her first club meeting in apprehension; the doctor arranges without her knowledge that one man after another asks her to dance.

The CHAIRMAN in summing up mentioned the lack of opportunity for the sexes to meet in penal institutions. It can be partly alleviated, he said, by having a woman nurse on the male side of the institution.

SUDAN MEDICAL SERVICE

THE activities recorded in the report of the Sudan Medical Service for 1941 would be creditable in times of peace and are doubly so under the stress of war—there is no evidence of restrictions either in performance or production. The general health of the Sudan remained satisfactory and the incidence of epidemic disease below the average. The small amount of malaria in the Northern Sudan is attributable to favourable climatic conditions. The strain of war and lack of leisure took their toll of British officials, who showed a higher incidence of sickness and consequently a greater number of deaths and invaliding than for some years past. Cerebrospinal fever topped the list of epidemic diseases, and some 1824 cases were reported with 459 deaths, which compares favourably with 1936 when there were 13,440 cases and 8906 deaths. Diphtheria was not of major importance. Relapsing fever incidence was above the average, with 3028 cases and 110 deaths. The small amount of smallpox (46 cases with none fatal) bears testimony to the efficacy of the extensive vaccination campaigns of the last four years and to the lymph produced in the local Stack laboratories.

For the first time, a case of tick typhus was reported in Equatoria Province. Yellow fever was absent during the year. Bilharziasis (*B. hæmatobia*) constituted no real danger, but remains as a potential menace to the irrigated areas of the Gezira. The incidence of blackwater fever (28 cases with 9 deaths) is not great; Arab Sudanese provided the greater number—not a single European was affected. Guineaworm is prevalent in Equatoria Province, the Nuba Mountains and the Bor district of the Upper Nile Province, but now that anti-guineaworm wells have been constructed in many endemic areas, it is reasonably hoped that there will be a reduction in this disease. Regarding dysentery, it is rather surprising to read that of 3661 cases admitted to hospital 2924 were diagnosed as amœbic and only 737 as bacillary in origin, though the war must have considerably increased the incidence of the latter. On the other hand, the incidence of enteric fevers remained remarkably low, only some 129 cases being recorded. Among the 477 cases of kala-azar reported there was a remarkably high mortality, with 138 deaths; these must be largely attributed to the recent campaigns in the very worst endemic centres. In spite of treatment with 'Stilbamidine' many patients succumbed and the Sudan variety appears to be particularly resistant to any form of treatment. Under the heading of cutaneous leishmaniasis there was one example of espundia (mucocutaneous leishmaniasis) which has occasionally been recorded before from the Sudan. The 46 cases of oriental sore came mostly from the Kordofan Province. Of trypanosomiasis 125 cases were reported in Equatoria Province, 47 in a fresh outbreak in the Meridi district and 1 in the Kajo Kaju subdistrict. A pass system was organised between the Sudan and Belgian Congo, and between the Sudan and French Equatorial Africa, in order to limit the spread of the disease and enable people to visit relatives.

The section on public health and hygiene, by Lieut.-Colonel H. A. Crouch, describes special measures for the control of yellow fever in view of the remarkable outbreak in the Nuba Mountains in 1940. There has been no recrudescence. Immunisation has been carried out on an extensive scale for all members of the Forces, all officials, police, railway and steamer personnel, medical staff, school-children, missionaries and others going south of Khartoum. All guards and employees on aerodromes were included and mass inoculation was undertaken in villages near aerodromes, posts and lines of communication. The campaign against aedes mosquitoes has been a feature of public health work, necessitating the employment of extra staff.

POSTWAR INTERNATIONAL COLLABORATION IN MEDICINE.—Dr. Melville Mackenzie has chosen this subject for the Harben lectures which he is to deliver to the Royal Institute of Public Health and Hygiene, 28, Portland Place, London, W.1, on Jan. 24, 25, and 26 at 3 P.M.

Reviews of Books

Permeability of Natural Membranes

H. DAVSON, D SC, associate professor of physiology, Dalhousie University, Canada; J. F. DANIELLI, D SC, AIC, Beit memorial research fellow and fellow of St. John's College, Cambridge. (Cambridge Univ. Press. Pp. 361. 25*s.*)

THE authors have undertaken a task long overdue in compiling the available evidence—for much of which they are personally responsible—on the fundamental question of permeability. They are not too technical for any medical reader who is willing to skip a little. Serious students of physiology and biochemistry, and teachers of these subjects, will find much valuable information and many new ideas. The behaviour of the various kinds of membrane encountered in the body is succeeded by a summary of modern views on the nature of the cell membrane. Equilibria, and partial or selective permeability of a membrane are discussed. Experimental methods are explained, and the tricks employed by the erythrocyte to deceive investigators are frankly exposed. The book is rounded off by chapters on hæmolysis, secretion, renal function, and the kind of theory of permeability which seems to be emerging from the available evidence. The authors claim no more than to draw attention to the transition from qualitative to quantitative studies of living membranes. They write critically and they neither oversimplify nor elaborate unduly on inadequate evidence.

Annual Review of Biochemistry.

(Vol. XII.) Editors: J. M. LUCK, J. H. C. SMITH, Stanford University. (Lewis. Pp. 704. 31*s.* 6*d.*)

THE articles in this volume are well up to the standard we have come to expect. Lipman's section on the biological oxidations and reductions gives a good summary of the present position, and contains some valuable notes on the dropping mercury electrode, and the use of polarography in the study of enzymes. The proteolytic enzymes are discussed by Herriott in a timely review of a subject about which biochemists tend to remain rather old-fashioned. Besides such usual subjects as the steroids, proteins and amino-acids, vitamins, and synthetic drugs the book covers the microchemistry and electron microscope.

Hermaphroditos

The Human Intersex. A. P. CAWADIAS, MD DURH., FRCP, physician, St. John Clinic and Institute of Physical Medicine, London. (Heinemann. Pp. 78. 15*s.*)

THIS book is an extension of Dr. Cawadias's Thomas Vicary lecture to the Royal College of Surgeons. It is also an improvement on it, for some of the unduly optimistic claims for endocrine treatment then made have been wisely omitted. The author exposes and explains historically the fiction of the true hermaphrodite and proceeds to elaborate in detail and with ability his personal views. These rest upon certain premises with which all students would agree.

> "A male is not a male because he has testes; he has testes because he is a male, and similarly a female is a female not because she has ovaries but has ovaries because she is a female."
>
> "Intersexuality is a normal phenomenon. There is no absolute male nor absolute female."
>
> "The system of sex determination . . . consists in an interaction of a biological field, a sexoformic impulse and a biological environment."
>
> "The biological field of the human embryo is bisexual. . . . On this [illegible] sexoformic impulse . . . acts," always [illegible] the genic sex organisers and the endocrines.

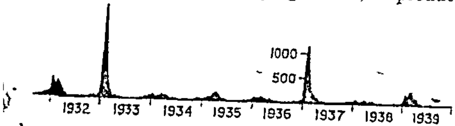
But though this hypothesis is ably developed, there are curious omissions which deny to this book the rank of a classical monograph. The experiments of Greene and his associates in America, which are favourable to the thesis, are not mentioned. Goldschmidt is too cavalierly dismissed, although in many respects he too is a friend. There is, too, a tendency to describe at length the patients who "fit" well, and to leave unmentioned such awkward cases as Guldberg's example of uniovular twins, one female and one gynandroid.

THE LANCET

LONDON: SATURDAY, DECEMBER 25, 1943

INFLUENZA

THERE is an inevitable fascination in contemplating charts of the varying annual toll of influenza, in considering why the disease hits us in one year and not in another, and in peering thence into what lies ahead. This pastime has been rather more profitable since 1933 when a virus, now called influenza A virus, became amenable to laboratory study, and still more so since 1940, when a second agent, influenza B virus, was recognised. We can now be sure that there is every winter a basic level of respiratory infection which is not due to either virus, and that in some years a superimposed wave is caused by virus A, at other times by its brother, B. In Britain for the last decade these waves have all been in the early months of the year. Before B was recognised, there were widespread A outbreaks in 1933 and 1937 with a lesser one in 1935. The accompanying chart, reproduced by courtesy of the Ministry of Health, shows deaths from influenzal pneumonia in London and the great towns. A minor outbreak in 1939 was partly due to A, partly to B; another small-scale prevalence in early 1941 was associated with virus A only. Three papers in this issue record that what little influenza there was at the beginning of 1943 was largely caused by virus B, not at all by A. Clinically this influenza B was not to be distinguished from A, nor from certain other influenza-like illnesses of unknown cause in which no virus could be detected. None of the B outbreaks so far on record has been very widespread or severe. It seems that major peaks on the influenza curve mean that virus A is at large; and we understand that A is the culprit in the current epidemic. It is odd that A viruses are harder to establish in ferrets and mice when the epidemic is a minor one; and B seems even trickier to work with. Stuart-Harris, Glover and Mills failed to get any 1943 B strain to produce symptoms in ferrets or mice, or to infect chick embryos. Himmelweit, however, persuaded one strain to infect chick embryos, though not mice, after many passages through ferrets.



One point brought out by these papers is that right at the end of last winter's influenza season, just as virus B infections were petering out, virus A turned up and caused a few local outbreaks right into the summer. Here may well be an explanation of why influenza burst exceptionally early this winter; the virus was probably already in our midst, waiting for the seasonal conditions suitable for its rapid spread. Many will note that after four years of war an epidemic has come at a rather abnormal season; they will think of 1918 and will be anxious lest a repetition of the [illegible] unpleasant things to happen before spring, including a possible second wave caused by virus of changed character. But we may be comforted by the fact that by June, 1918, almost at the beginning of the first wave of the pandemic, there was a tendency for increased mortality to invade the age-groups under 30. There is now general agreement with the far-seeing Greenwood that this tendency was the cardinal feature of "1918." As yet there is fortunately no such tendency in the current visitation, but it is to be hoped that practitioners will keep a sharp lookout for this danger-signal. It remains to be seen whether there is any truth or significance in the influenza fatalities in young factory-workers just reported in the lay press as occurring in Berlin.

Victims of influenza may like to know the latest news about the properties of the virus which is hitting them. Earlier estimates [1] gave the size of influenza A as 80 to 120 (probably 90 to 100) mμ. Work published in the United States earlier this year [2] suggested that this estimate was too high and that the virus was actually amongst the smallest known, only 10–12·5 mμ in diameter. The apparent larger size was, so it was asserted, due to carriage of the virus on larger particles coming from the animal tissues. Electron micrographs were reproduced showing minute bodies of the order of 10–15 mμ. These unexpected findings were not confirmed by work over here, as recent correspondence in our columns testified.[3] Work from another group in the USA [4] now makes it probable that original British measurements of the virus's size were not far out (80 mμ is the figure given) and that the small particles seen in the first electron micrographs did not represent the virus at all. This group go further and reproduce micrographs of their own showing particles about 80 mμ across presumably representing the virus. "Some of the images are essentially round and reveal, centrally placed, a circular region of greater density than that of the surrounding structure . . . other images appear to be kidney-shaped. . . . This variation in form could be due to kidney- or bean-shaped particles seen lying in the field in various positions with respect to the indented region." Influenza B [5] looks much the same but is significantly larger, about 100 mμ across.

FORMATION OF LYMPH IN THE LUNGS

THE literature of lymph formation has been well reviewed of recent years,[6-11] and to Drinker and his colleagues at Harvard we owe a debt for their illuminating observations and opinions. They paid particular attention to the lungs, and their achievements have been due to the successful collection of lymph from the lungs of the dog; after which it was

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1. Elford, W. J. and Andrewes, C. H. *Brit. J. exp. Path.* 1936, 17, 422.
2. Chambers, L. A., Henle, W., Lauffer, M. A. and Anderson, T. F. *J. exp. Med.* 1943, 77, 265.
3. *Lancet*, Oct. 23, p. 526, Nov. 6, p. 588.
4. Taylor, A. R., [illegible] Dingle, J. H. and Fell [illegible]
5. Sharp, D. G., T[illegible] d, D., Beard, J. W., [illegible] 1943, 98, 307.
6. Drinker, C. K. and Field, M. E. [illegible]
7. [illegible]
8. [illegible]
9. [illegible] 1943, 18, 93.
10. McMaster, P. D. *Ann. Rev. Physiol.* 1943, 5, 207.
11. Drinker, C. K. The Lymphatic System, London, 1943.

a short step to the measurement of lymph flow under a variety of experimental conditions. Appreciation of the problems involved demands some knowledge of the anatomical arrangement of the lung lymphatics. For this knowledge William Snow Miller[12] is chiefly responsible and his views may be stated briefly as follows :—

> In the human lung the deep lymphatic system consists of four groups of lymphatics, the peribronchial, periarterial, perivenous and septal (interlobular), which communicate with one another especially where the bronchi divide. Miller states that no lymphatics are found beyond the alveolar ducts, from which region the four groups may be said to have a common origin. In general the lymph flow in the deep lymphatics is towards the lung hilum ; there are, however, but few valves except at the hilum and just beneath the pleura where the venous lymphatics join the pleural lymphatics. On the other hand, the superficial lymphatic plexus of the pleura is provided with numerous valves, those in the main collecting trunks of the plexus opening towards the hilum. The deep and superficial lymphatic systems anastomose in the following manner : short connecting lymphatics accompany the branches of the pulmonary veins draining the pleura—they connect the pleural lymphatics with the lymphatics draining the alveolar ducts. These connecting lymphatics have valves which open towards the pleura and prevent the flow of lymph from the pleural lymphatics into the deep lymphatics. It follows that the zone where the short connecting lymphatics join the deep lymphatics draining the alveolar ducts may be considered as a lymph " shed." The " shed " is situated just beneath the pleura and averages 2–3 mm. in depth. Thus lymph formed in this zone may flow towards the lung hilum by way of the deep lymphatic system or towards the hilum by way of the short connecting lymphatics and superficial pleural lymphatic plexus. This means that the short connecting lymphatics furnish a bypath for the lymph by way of the pleural plexus in the event of obstruction to the deep lymphatic system.

From Miller's observations it would be expected that a transudate or exudate formed from the blood of the capillaries supplying the alveolar " ducts " and alveoli would find its way into the adjacent tissue spaces and be taken up by the lymph channels in the region of the alveolar ducts, whence it would be carried to the hilum of the lungs both by the deep lymphatics and by the superficial lymphatic plexus.

Under normal conditions the hydrostatic pressure in the pulmonary capillaries is probably below the osmotic pressure of the blood proteins ; hence, if the pulmonary capillaries resemble those of the systemic circulation, they are organised for ridding themselves of excess fluid but not for the formation of fluid.[9, 14] That the lungs can absorb large quantities of water has been demonstrated by Colin[13] who gave 21 litres of water to a horse intratracheally in 3½ hours without detriment to the animal. Whether all such fluid is absorbed by the blood capillaries is unknown, but it is not unlikely that some finds its way directly into the lymphatic spaces. The Harvard school have shown that the reverse process of transudation and exudation with consequent formation of lymph is potentiated by anoxia, by the inhalation of irritant gases and by strong respiratory movements. In the first two of these conditions capillary damage leading to greater permeability is the important factor, while the effect of respiratory movements is attributed to increased negative pressure in the chest which tends to promote pleural as well as pulmonary exudates even if oxygen lack is avoided. These Harvard experiments have their counterpart in the investigation of Yamada[14] who found pleural fluid in 29% of Japanese soldiers at rest and in 70% following severe muscular work. Drinker and Warren[15] suggest that in cardiac dyspnœa there is a tendency for fluid to be drawn from the pulmonary capillaries by the increased negative pressure, and, if anoxia is present, the resulting capillary damage augments this fluid formation. A pernicious process is thus set up ; for the greater the amount of alveolar fluid, the less is the chance of oxygen reaching the blood in the capillaries. Administration of oxygen under anoxial conditions diminished the lung lymph flow, and this shows the importance of anticipating the start of the pernicious process by early oxygen treatment. Drinker and Warren believe that clinically we may fail to appreciate the patient's need for oxygen until too much time has passed : with present criteria the decision that oxygen treatment is needed usually comes about twelve hours too late. Incidentally, though there is general agreement that an increased capillary pressure favours transudation, it is probable that in the absence of the capillary damage this factor has been overestimated ; thus " back-pressure " effects on the lung capillaries are not of primary importance.[9, 16]

That the capillary wall allows protein to pass in either direction is indicated by the normal formation of lymph in the lungs and by experiments which show that foreign protein injected into the airway passes slowly into the blood-stream.[17] These issues are brought into focus by the admission that without more precise knowledge of the hydrostatic pressure in the pulmonary capillaries, and of the degree of permeability of the membrane, transudation phenomena cannot be interpreted. The assumption that the capillary pressure is midway between the pulmonary arterial and pulmonary venous pressure is probably unjustified ; indeed it is likely that both pressure and permeability vary widely from moment to moment in any given part of the vascular bed because the state of the capillary is constantly changing. In this connexion Drinker and Warren[15] dismiss the idea that nervous mechanisms control the pulmonary vascular bed, but their view is hardly in accord either with experimental evidence[18] or with clinical experience.[16] The question seems to be not whether nerves exert control on the pulmonary vessels but rather to what degree and on what portions of the vascular bed they do so. All the lung capillaries are not open at one and the same time, for they have been seen to be continually opening and closing.[19] The blood flow even in fully open capillaries may show wide changes and on occasion reversal. Such activity, whether due to nervous or humoral mechanisms, will surely have some influence on the capillary pressure and on the permeability of the capillary walls. It is known, for instance, that the gaseous content of the blood influences capillary permeability ; it is increased by a low oxygen and high carbon-dioxide content. One can imagine, therefore, that sluggish a short step to the measurement of lymph flow under a variety of experimental conditions. Appreciation of the problems involved demands some knowledge of the anatomical arrangement of the lung lymphatics. For this knowledge **William Snow Miller**[12] is chiefly responsible and his views may be stated briefly as follows :—

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[13] Colin, G. Traité de physiologie comparée des animaux, Paris, 1873, vol. II, p. 109.
[14] Yamada, S. S. *Z. ges. exp. Med.* 1933, 90, 342.
[15] Drinker, C. K. and Warren, M. F. *J. Amer. med. Ass.* 1943, **122**, 269.
[16] Luisada, A. *Medicine*, 1940, 19, 475.
[17] Drinker, C. K., Warren, M. F. and MacLanahan, M. *J. exp. Med.* 1937, 66, 449.
[18] Daly, I. de Burgh, Harvey Lectures, New York, 1936.
[19] Wearn, J. T. et al. *Amer. J. Physiol.* 1928, 85, 410.

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15. Drinker, C. K. and Warren, M. F. *J. Amer. med. Ass.* 1943, 122, 269.
16. Luisada, A. *Medicine*, 1940, 19, 475.
17. Drinker, C. K., Warren, M. F. and MacLanahan, M. *J. exp. Med.* 1937, 66, 449.
18. Daly, I. de Burgh, Harvey Lectures, New York, 1936.
19. Wearn, J. T. et al. *Amer. J. Physiol.* 1928, 85, 410.

capillary blood flow to an ill-ventilated air sac will lead to increased capillary permeability because the regional oxygen tension will be low and the carbon-dioxide tension high. Unequal alveolar ventilation has long been recognised as important, and if it is associated with unequal alveolar capillary blood-supply, may not this explain the patchy distribution of œdema fluid in the lungs observed by Soma Weiss? We may add that the mechanism of neuropathic pulmonary œdema may be closely bound up with the nervous control of the pulmonary vascular bed; the arterioles and possibly venules are supplied with nerves, but the evidence for the capillaries being so supplied is not unequivocal. Here there is a wide field for exploration; but if advances are to be made it will require all the experimental skill that Drinker has brought to bear on his own problems.

The conditions governing pleural transudation differ from those for alveolar transudation. The significance of Miller's work on the blood-supply to the pleura has not been fully recognised. In man the pleura is supplied by the bronchial arteries derived from the systemic circulation. Are we to regard these systemic capillaries as having the same permeability properties and pressure relations as those supplying the alveoli? Clearly not without direct evidence that it is so. A priori, it would be expected that the hydrostatic pressure in the pleural capillaries would be greater than that in the alveolar capillaries, and (other things being equal) transudates would arise more easily from the pleural capillaries. The fact that the bronchial arteries are the source of supply to the pleura in some animals, and the pulmonary artery in others, might be put to good use in planning further experiments.

Distension of the lymphatics almost always accompanies lung œdema: it has been observed with anaphylactic shock, lung blast, sudden decompression, poisoning by irritant gas, and bilateral vagotomy. Presumably it indicates that the rate of formation of transudate or exudate exceeds the rate of removal by the lymphatics. Since the four main groups of deep lymphatics communicate with one another, they may be regarded as a parallel network. It would be expected, therefore, that if one group shows distension, the remaining three would also be distended. But in animal experiments distension is apparently not always uniform. The differences may arise because of local obstruction of lymphatics by the pressure of œdema fluid or because the systems of deep lymphatics in certain laboratory animals differ from those in man. It follows too from Miller's description for man that if the deep lymphatics are fully distended, the superficial plexus should be likewise distended; but under experimental conditions this is not always so.[20] Such discrepancies may appear of minor importance but they must be explained if the results of animal experiments are to be applied to pathological processes in the human lung.

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[20] Trowell, O. A. *Quart. J. exp. Physiol.* 1943, 32, 203.

Liverpool School of Tropical Medicine.—The work carried on in the department of tropical medicine under the late Prof. Warrington Yorke is to be continued in two new departments which the council of the school have created. Dr. A. R. D. Adams is to take charge of the practice of tropical medicine and Dr. E. M. Lourie of research in chemotherapy.

MEDICINE AND THE CHURCHES

The mistrust between orthodox religion and progressive science has limited the usefulness of both. "With increase of knowledge," writes Sir Richard Gregory,[1] "much of the mystery upon which religious beliefs are based is revealed and new concepts have to [illegible] when th [illegible] function [illegible] between religion and science." The changes associated with modern civilisation are, he points out, the results of scientific discovery and mechanical invention, and progress in these has never been encouraged by religious teaching. Certainly there has seldor been any noticeable zeal—on either side—for coöper tion between the Church and medicine, and thei are perhaps some problems of social life in whic the Churches have not been willing to take thei full share of responsibility. Happily there is ev dence of a new spirit of alliance between medicine the Churches, and education against preventabl disease and in favour of attainable health, especiall in the young.

Psychoneurosis is one of the major preoccupation of medicine today, and will still be one tomorrow Some patients suffering from this disease requi expert psychological help, but obviously many want more than that; to protect them from developing a chronic psychoneurotic state they need a philosophy that will support and reinforce them against the slings and arrows of outrageous fortune. Neither in church or school or clinic is such a philosophy easily come by; and those who aspire to provide it must have sympathy, great patience, knowledge of the world, and sanity of outlook. The efforts of a counsellor without these qualities are worse than useless—and they are not fruits that grow on every tree. Yet help of this kind is enormously valuable in the resettlement of many whose future happiness and working capacity hang in the balance. Without it they tend to "put on the strong armour of sickness"; whereas experience of men invalided out of the Services because of psychoneurosis indicates that, given the right kind of help, they can settle down to a useful life as successfully as their neighbours.

Improvement of the general health is coming to depend more and more on the coöperation of the individual. Religion and education can do much to foster the social sense—the attitude of the good neighbour—which is necessary to life in communities, and doctors are increasingly aware that their success or failure depends largely on social attitudes. Since this is so, they must resist the temptation to think narrowly in terms of their own specialty. Scientific ideas, like religious ideas, can be used in such a way as to restrict imagination instead of expanding it. The conflict between Huxley and Wilberforce at the Oxford meeting of the British Association in 1860 is felt by many to have created or perpetuated an unnecessary gulf between science and religion. It is not enough, they say, that this gulf should be bridged: the bridge could be used for joining forces in a united campaign for health of body and mind.

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[1] Gregory, R. A. Education in World Ethics and Science. Watts and Co., London, 1943.

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Recently, Gowen and Nelson[1] have announced the production of a strain the females of which produce 100% males, irrespective of the males to which they are mated. This result is due to a dominant gene whose action is limited to the female sex. Thus in drosophila, in one sense, complete sex-control is possible: stocks can be bred which yield offspring of one sex only, either females or males at will. The discovery of course can hardly be said to have any application to man. This is no simple matter of an injection or a pill, ensuring the arrival of a baby of the required sex. It hardly stirs the pulse to be told that some day, if the appropriate genes happen to be discovered in man, it might be possible after many generations of selective breeding to produce women whose fertilised ova of one sex or the other would die at a conveniently early stage. Primitive peoples, who eliminate unwanted babies as soon as they are born, would hardly regard the method as a practical advance.

ORIGIN AND PATTERN OF RETINAL HÆMORRHAGE

WHAT determines the distribution of retinal hæmorrhages in vascular disease and what is the anatomical reason for their pattern? In his Montgomery lecture to Irish surgeons Ballantyne[2] gives an answer to these questions based on ophthalmoscopic and microscopical findings. Three common causes of retinal venous hæmorrhages are choked disc, subarachnoid hæmorrhage, and thrombosis of the central retinal vein. The immediate cause of the hæmorrhage in all three is the obstruction to the outflow of blood from the retinal veins, and yet the distribution of the hæmorrhage is different in each case. Ballantyne explains that in healthy blood-vessels extravasation of blood through the vessel walls from back pressure will be chiefly where the vessel changes course or where it receives increased or decreased support from surrounding tissues. At the optic disc the vessels both change their course and lose support, so that when pressure suddenly rises, as in choked disc, the hæmorrhages will be situated at and around the disc. In subarachnoid hæmorrhage the rise of pressure is most sudden, and here the hæmorrhages arise not only in the retina around the disc but also in the orbit where there is lack of support for the vessel wall. Thrombosis of the central retinal vein causes widespread venous hæmorrhage throughout the retina. Here, while the actual blockage has been sudden, this is only the final phase of a progressive obstruction. The vein behind the lamina cribrosa has been gradually narrowing, and the circulation in the vein getting slower, with the result that the vein walls suffer from anoxæmia and become devitalised. At the moment of final obstruction the pressure, acting on the weakened walls, causes hæmorrhage throughout their length. The exact source of a small retinal hæmorrhage can often be estimated by closely observing its shape. Such hæmorrhages are chiefly found in the intervals between visible retinal vessels, which suggests that they are capillary in origin. An interesting picture of capillary hæmorrhage is that in which a blood-vessel passing through a patch of hæmorrhage is accompanied by a blood-free zone—a pale band on either side of the blood column. This blood-free zone closely corresponds to the capillary-free zone found on either side of the retinal arteries.[3]

It is common knowledge that striate, flame-shaped, or brush-like hæmorrhages take on this form because they are situated in the nerve-fibre layer of the retina, and the blood naturally tracks between the fibres which are here lying parallel to the surface. Such hæmorrhages come from the arterial side of the capillary system, and are often seen in hypertension. Hæmorrhages from the venous side of the capillary system are usually found in the deeper retinal layers, because the efferent veins of the retina are derived from the deepest capillary plexus. They are especially common in the outer molecular layer, where owing to the direction of the fibres the tissues tend to split in a vertical direction, allowing the hæmorrhage, as seen with the [illegible] to assume a punctate [illegible] of the kind are well [illegible]

AGRICULTURE AND MILK

AFTER the war this country will again import large amounts of grain, sugar and other products more cheaply grown abroad; but if we are to raise the standard of nutrition British agriculture will have to provide more of the so-called protective foods—fruit, vegetables, eggs, and especially milk and dairy products. It does not follow that corn-growing and the traditional feeding for beef will fall below prewar levels; they may be higher. Each occupies an interdependent place in a system of mixed farming without which soil fertility cannot be maintained.

The war-time ploughing of millions of acres of permanent grass, much of very low quality, has produced arable crops; but there are already indications that it may easily lead to soil exhaustion which is being accelerated by the decrease in the number of livestock. Stapledon and Davies[1] nevertheless believe that it can do infinite good if we think in terms of sensible rotations and regrass as we go. Last year—and even more this year—there have been protests against the Ministry of Agriculture's policy of a larger and larger corn acreage, particularly in areas unsuited to corn production. Stapledon and Davies claim that the temporary ley (lea or sown pasture) will yield more animal food than the best permanent grass or any cereal, and will on the lowest estimate be equal to that of roots or kale. Even when these yields are transcribed into units of human food the temporary le[illegible] with most arable crops. Ley [illegible] corn production complementa[illegible] milk production and make it less dependent on imported food-supplies. Some of the claims made for it may be disputed, but there can be no doubt that the policy of "taking the plough round the farm" is gaining in popularity.

If farmers have reasonable financial security and good technical advice they will no doubt respond to the nutritional needs of the nation, but the difficulties of their tasks and the inducement required should not be underestimated. At a discussion on milk held by the Nutrition Society some time ago Mr. J. L. Davies defined the three primary requirements of the milk industry as (1) a ten-year plan involving expenditure of £100 million on capital equipment urgently needed; (2) a large measure of control over the diseases of dairy cattle; and (3) an adequate supply of good labour for which a six-day week would be necessary. The risks from disease are greater in dairy-farming than in any other branch of livestock farming, and the control of tuberculosis and brucellosis, or even the production of clean milk, requires a degree of supervision unnecessary in other branches. Before the war milk production accounted for over a quarter of the total agricultural output, and milk was [illegible]

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[1] *Science*, 1942, 96, 558.
[2] Ballantyne, A. J. *Irish J. med. Sci.* October, 1943, p. 551.
[3] Michaelson, I. C. and Campbell, A. C. P. *Trans. ophthal. Soc. U.K.* 1940, 60, 71.

[1] Stapledon, Sir G. and Davies, W. Ley F[illegible] Special, No. 99, 1942.

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3. U.K. 1940, 60, 71.

1. Stapledon, Sir G. and Davies, W. Ley Farming. Penguin Special, No. 99, 1942.

Annotations

SULPHONAMIDES AND MENINGITIC SEQUELÆ

Maddock[1] has studied sequelæ in 1075 patients who recovered from cerebrospinal fever after chemotherapy. In every case the diagnosis had been bacteriologically proved; the nurses of the American Red Cross Harvard Unit Hospital paid the follow-up visits and either saw the patients or got information about them from relatives or neighbours. The time between discharge from hospital and the visit varied from 1 month to 2 years. In all, 254 (23·6%) complained of some disability dating from the attack. Headache was the commonest sequel, being present in 117. More serious symptoms were fortunately rarer; 6 had lost the sight of one eye, 1 of both eyes; 13 were totally deaf and 24 had impaired hearing. There was one case each of hydrocephalus, spastic paralysis and facial paralysis; 10 had strabismus; 18 were said to have changed in disposition and 9 children were retarded in development. Weakness of the legs was noted in 22, and muscular pains in 28. Other symptoms included errors of refraction, nervousness, irritability, poor memory, lack of concentration, easy tiring and depression. Maddock suggests that the list appears more formidable than the facts warrant, since these sequelæ are not all necessarily permanent. Headaches, for example, usually diminish in intensity and finally disappear. A group of 31 patients reported to have disabilities were fully examined by doctors 3–8 months after the nurses had made their visits; 16 of them had completely lost their symptoms and were in perfect health; in 7 the sequelæ reported had not been due to the illness; 2 had symptoms possibly due to meningitis but beginning to clear up; and in only 9 were there permanent sequelæ due to meningitis. The dosage of sulphonamide bore no apparent relation to the incidence of sequelæ, and Maddock supposes that in many patients damage to the central nervous system is probably done at the onset of the illness and is not affected by chemotherapy.

UNDER-WATER BLAST

An ingenious technique has been described by American workers for studying the effects of rapid compression waves on animals submerged in water. Since the results run closely parallel to those found by a number of observers[2] in man and animals exposed to depth-charges, it looks as though the laboratory worker were now provided with a simple way of investigating under-water blast without the limitations and fuss imposed by the use of explosive forces.

Clark and Ward[3] describe a method of subjecting animals to shock waves in water by dropping a weight on a floating plunger. In one end of a steel U-tube filled with water or saline is loosely fitted a wooden plunger on which a rack carrying a falling weight, released from any desired distance, is allowed to fall. The anæsthetised animal is in the other end of the U-tube, within a tubular cage of hardware cloth or, if water surging is to be wholly avoided, in a tin can, open at the top and almost filled with water. The impact so produced sets up waves very like those generated by setting off an explosive under water, with primary "compression" waves of extremely short duration (1/5000 sec.) and no surge of water such as occurs when the gases of an explosive expand. By varying the weight on the rack and the distance of fall a great variety of lesions may be produced. Under extreme conditions the animals are killed in a few minutes; with lighter impacts they survive longer or recover completely. The immediate effect is a rapid slowing of the heart-rate and cessation of respiration for a few seconds to more than a minute, followed by laboured and ineffectual respiratory movements. Intrapulmonary bleeding sets in at once and may lead to early death. Although occasional animals show loss of corneal reflexes, ataxia and incoordination immediately after the blow, direct involvement of the central nervous system is exceptional and electro-encephalograms provide no evidence of concussion at the time of the impact. Autopsy findings in these animals are identical with those described by Cameron, Short and Wakeley[4] and Williams[5]: they include massive pulmonary hæmorrhage, bruising and hæmorrhage in the stomach, lower ileum and cæcum, with occasional rupture of stomach or intestines and hæmorrhage into the peritoneal cavity or lumen of stomach and intestines. As pointed out by the British workers, the solid viscera, in contrast to air-containing cavities, rarely show damage.

Some of Clark and Ward's conclusions may be briefly summarised. The greater the impact, the more damage to the animal; the larger the animal the less the effect for a given impact. The more hunched-up the animal is in the water, the less seriously is it affected. With incomplete submersion, only that part of the animal below the water level at the time of impact shows the typical lesions. (The work of Cameron, Short and Wakeley,[3] does not, however, bear out this conclusion.) Damage is greater to fully inflated lungs than to deflated lungs. Protective coverings, such as cork or sponge rubber life-preservers, save the regions covered from much of the effect of an otherwise fatal blow.

PREDETERMINATION OF SEX

Fluctuations in the sex ratio during war, discussed by Dr. Martin on p. 807, remind us how little influence we have with our posterity, even at the outset. Only in the present century has the mechanism of sex-determination been elucidated. Basically it is simple enough in man. The sex-chromosome pair in the female somatic cell consists of two equal members, the x-chromosomes. The male somatic cell, on the other hand, contains an unequal pair, consisting of one x-chromosome and a smaller y-chromosome. When the gametes are formed, the members of each chromosome-pair separate, so that whilst all ova contain an x-chromosome, half the spermatozoa contain an x-chromosome and half a y-chromosome. Should it chance to be an x-bearing sperm which fertilises the ovum, the result is a girl; should it be a y-bearing sperm, the result is a boy. Many other living things exhibit an identical or very similar mechanism. It is not always, it is true, quite as simple as the scheme just outlined, but in no case can the primary determination of the sex of the new individual be termed really complicated.

It is one thing, however, to understand how a mechanism operates and quite another to control it. Many possible approaches have been attempted, though nearly always with negative results up to the present. The day is probably far off when the sex of the future child can be determined at will—or indeed materially influenced—in the desired direction. It has been shown, however, in animal experiments that a tendency to produce an excess of females or of males may be to some extent genetic; and generations of selective breeding can on occasion produce strains which do yield some preponderance of one sex or of the other. Furthermore, in drosophila much more definite means of predetermination have been demonstrated. Lethal genes have been discovered which are sex-linked and by introducing them into the x-chromosomes by breeding methods it is possible to ensure that some at least of the xy individuals, the males, do not develop. In fact, by utilising in addition genes which inhibit crossing-over (that is, the interchange

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1. Maddock, E. C. E. *Bull. Min. Hlth & EPHLS*, 1943, **2**, 111.
2. See *Lancet*, 1943, ii, 133.
3. Clark, S. L. and Ward, J. W. 1943, *Surg. Gynec. Obstet.* **77**, 403.
4. Cameron, G. R., Short, R. H. D. and Wakeley, C. P. G. *Brit. J. Surg.* 1942, **30**, 49; 1943, **31**, 51.
5. Williams, E. R. P. *Ibid*, 1942, **30**, 38.

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U.K. 1940. 60. 71.

1. Stapledon, Sir G. and Davies, W. Ley F[illegible] Special, No. 99, 1942.

many who have worked a seven-day week for 52 weeks in the year for many years. Under these conditions standards of cleanliness tend to be low, and it is becoming harder to obtain cowmen—they would rather drive a tractor, work horses, or tend stock which at least do not need milking twice or three times every day.

It is clear that the production of milk of high quality requires increased expenditure of money and effort, and a high standard of labour, all of which imply an increase in the price of milk. On the other hand if the optimum amount of milk is to be drunk the price must be lowered rather than raised. Control of disease, improved management, and particularly increased efficiency in distribution, may keep down the price. But it is not unlikely that the subsidising of milk for priority consumers will have to continue.

CANCER

> "One of the most hopeful features of the campaign against cancer is the fact that, in recent times, every year has made its special contribution to the sum of knowledge. When added together the contributions of the last ten years or so constitute a body of discovery so substantial as to justify the belief that the campaign is entering upon a new phase."

With this introduction the report rendered at the annual general meeting of the British Empire Cancer Campaign in Dec. 14 strikes an encouraging note. Three observations are picked out for special mention. One is the finding at the Royal Cancer Hospital that certain diets inhibit cancer of the mamma and cancer of the liver in mice. The second is statistical: an analysis of about 1000 cases of primary carcinoma of the lung reveals that the disease is four times as common in males as in females and that engineers, mechanics, and painters and decorators have a high incidence while clerks have a low one. Thirdly comes the confirmation of American statements that diethyl stilbœstrol inhibits the growth of prostatic cancer. This potent œstrogen, now widely used in clinical medicine, is an artificial substance synthesised by E. C. Dodds and his associates in 1938. It has been employed in cancer of the prostate by various surgeons in the United States and Canada in the hope that the secretory activity of prostatic metastases, like that of normal prostate, would be inhibited by the œstrogen. The cases mentioned in the present report are few. At the Middlesex Hospital one patient has been studied carefully for a year; at the Royal Cancer Hospital 2 patients seemed to derive no benefit either locally or generally, but in 5 others, which showed secondary deposits in bone, administration of stilbœstrol by mouth relieved the pain from these metastases, lowered the acid phosphatase level in the serum and also produced some degree of regression in the primary growth. This method of treatment is important in itself, for in England and Wales alone, Professor Dodds told the meeting, 4000 men die every year from prostatic cancer. But the chief significance of the work may lie in the fact that it is, in the words of the report, "possibly the first practical application of chemotherapy in the treatment of cancer." Stilbœstrol is a substance with many chemical affinities, and we may be sure they will be further explored.

THE HEART IN PREGNANCY

THE increasing care with which antenatal supervision is being carried out lends enhanced importance to the question of what constitutes a "normal" heart during pregnancy. The X-ray and electrocardiographic changes recorded in apparently healthy pregnant women have led to considerable controversy as to whether these indicate actual enlargement of the heart or merely an alteration in its position. In an attempt to clarify the issue, Hollander and Crawford[1] have carried out a routine examination in an unselected series of patients without any history, symptoms, or signs of heart disease who were first seen during the first 3 months of pregnancy. Anteroposterior and left and right oblique X rays of the heart were taken every 3 months during pregnancy and again 1 and 2 months after parturition; in addition electrocardiograms, using the two-string electrocardiograph thus obtaining simultaneous records of leads I and III, were taken every 4 weeks. As a result of rigorously excluding all patients who did not stay the course, their final observations are based on only 18 cases, but apparently the incomplete data in the other cases agreed with the findings in the fully investigated cases. The outstanding electrocardiographic changes were confined to lead III and consisted of a prominent, and even deep, Q wave and inversion of T, changes which occurred either together or separately. There was also a tendency for the electric axis deviation to show a shift to the left during the first 6 months of pregnancy and then swing to the right, the angle of axis deviation sometimes being as great as 28°, though it was usually nearer 15°. The important X-ray observation was the backward displacement of the œsophagus by the posterior surface of the heart, seen in 10 cases. Other changes noted were straightening of the left border of the cardiac shadow, prominence of the pulmonary conus, and an increase in the transverse diameter of the heart. The interpretation of these findings seems to be straightforward. The electrocardiographic changes are due to a shift of the heart to the left as a result of the raising of the diaphragm and rotation of the heart in the long axis. Cohn and Raisbeck[2] found similar large Q waves in lead III with rotating leads taken directly from the chest, and Thomson, Cohen and Hamilton[3] noted that the alterations in the Q and T waves were greater when the height of the diaphragm most affected the position of the heart. A strong argument against their being due to cardiac hypertrophy is that in Hollander and Crawford's experience the changes often disappeared towards the end of pregnancy. The radiological changes also can be explained on the basis of alteration in the position of the heart as a result of the raised diaphragm, but another factor probably comes into play here—the increased blood-volume which occurs during pregnancy and is accompanied by increased cardiac output. This attains its maximum at the 9th lunar month of pregnancy and then decreases steadily during the 10th month until by the 2nd month of the puerperium it has returned to normal.[4] Hollander and Crawford found that the indentation of the barium-filled œsophagus, present in the earlier stages of pregnancy, had practically disappeared by the 34th week of pregnancy. Their suggestion therefore seems valid, that this indentation is due to enlargement of the left auricle as a result of the increased volume of blood to be accommodated in the heart. These observations should facilitate the accurate diagnosis of early cardiac lesions during pregnancy and the puerperium.

The ARMY COUNCIL has decided that serving medical officers may participate in organised discussions, and express opinion, both individually and collectively, on the Government's forthcoming proposals for reorganisation of the civilian health services. Provided the discussions are held in off-duty hours, and Service channels of communication are not used to promote meetings or transmit opinions, there is "not only no objection to but every justification for such discussions being held."

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[1] Hollander, A. G. and Crawford, J. H. *Amer. Heart J.* 1943, 26, 364.

[2] Cohn, A. E. and Raisbeck, M. J. *Heart*, 1922, 9, 311.

[3] Thomson, K. J., Cohen, M. E. and Hamilton, B. E. *Amer. J. med. Sci.* 1938, 196, 819.

[4] Thomson, K. J., Hirsheimer, A., Gibson, J. G. jun. and Evans, W. A. jun. *Amer. J. Obstet. Gynec.* 1938, 36, 48.

Special Articles

SEX RATIO DURING WAR

W. J. MARTIN, PH.D. LOND.

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ONE of the best known features of vital statistics is the excess of male over female births. This phenomenon, as far as can be judged, has been permanent and common to mankind in general, though variations in the average size of the ratio occur in different periods and between various races. Tschuprow,[1] in a paper discussing the fall in the size of the sex ratio in many European countries, , during the last half of the ide of the 20th, propounded of the sex ratio was negatively correlated with the number of miscarriages and stillbirths. The male prenatal mortality was very much larger than the female but sufficient data were not available to establish that variations in the size of the sex ratio were mainly due to these factors.

It is well known that the ratio is susceptible to large social disturbances and in the years immediately after the war of 1914–18 there was a considerable rise in the sex ratio of all the belligerent countries. No completely satisfactory reasons for this rise have been advanced. In England and Wales the sex ratio, which had varied between 1032 and 1040 during the 60 years 1850–1918, rose in 1919 to 1060 and remained above the prewar level during the next two years with values of 1052 and 1051. A high sex ratio has also been recorded during the present war, the ratios, 1939–42, were 1050, 1058, 1054 and 1061. The last value is the highest ever recorded since the introduction of registration in 1838.

The war periods have also, in common, a very high marriage rate, the highest rates per 1000 of the population ever recorded being during these periods. The marriage rates during 1914–21 were 15.9, 19.4, 14.9, 13.8, 15.3, 19.8, 20.2, 16.9, and for 1938–42 they were 17.6, 21.2, 22.7, 18.7, 17.8. The mean marriage rate for the 102 years 1838–1939 was 16.1, and the only years when the rate exceeded 17.9 were during these two war periods. No correlation has been established between the large increase in the marriage rate and the sex ratio during 1919–20 owing to lack of data. Age of parents was not given in the birth certificate and the relationship between sex ratio and parental age had to be inferred from data relating to very small communities, or in more recent years from the data relating to the registration area of America where the ages of parents were included in the particulars of birth registration. Russell[2] found from an examination of American births that the sex ratio was not related to age of mother but that a slight association existed with the age of father. His values were:—

SEX RATIO OF BIRTHS AT VARIOUS PARENTAL AGES

Parent	15–20	20–25	25–30	30–35	35–40	40–45
Mother	1059	1059	1059	1052	1058	1052
Father	1065	1063	1059	1058	1053	1050

It is now possible, with the tabulation of the first fertility statistics of England and Wales relating to 1939, to make a direct approach to the problem. The births were tabulated by age of mother but not by age of father, and the sex ratios were:—

Under 20	*20–25*	*25–30*	*30–35*	*35–40*	*40–45*	*45–50*
1062	1063	1047	1053	1034	1025	962

The values exhibit a steep decline with increasing age, although the continuity is broken at ages 30–34, and are in marked contrast with the American ratios. The difference between the trends of the two countries may be due to the different distribution of births in America; the family is larger and the mother's age is lower than in England and Wales. The first births formed 36% of all American births in 1936, and 42% of the legitimate births in England and Wales during 1939; 70% of the American first births were born to mothers aged less than 25 years, while only 42% of the English first births were age group. Despite this large England and Wales formed 67% ages under 25, while in America the percentage was only 57. It cannot be determined whether the above trend in England and Wales is typical of the average experience or not, since statistics for the years subsequent to 1939 are not yet available but it seems probable in view of the large number of births involved—over 600 000—that the sex ratio will be found to have a similar trend. Russell found from 6,000,000 American births that the sex ratio declined with order of birth until the fifth birth, when it tended to a constant value, the ratios were 1061, 1060, 1058, 1055, 1051. The same trend was shown in France[3], the sex ratios based on nearly half a million births were 1075, 1037, 1051, 1039, 1035 and only 1022 for the sixth rank and over. No data are available to determine whether age of mother is a factor in the size of the ratio within the rank of birth, but that it is probably so may be indirectly inferred from the French data. The sex ratio of the first births declined with increasing age of father, for the age groups under 25, 25–34 and 35–49 it was 1081, 1074, 1059. This relation possibly holds for age of mother, since there is a fairly high correlation between age of husband and wife. On these assumptions the high sex ratio during the war periods can be explained in part if not wholly, since a very high marriage rate prevailed in both periods and a sustained increase in the number who marry means a lower average age at marriage. The average age of mother at maternity would decrease and the proportion of births to young mothers would increase; 35% of the first maternities during 1939 occurred within one year of marriage and 61% within two years, with a consequent rising of the sex ratio.

MATERNITY SERVICES IN LONDON

A SURVEY WITH RECOMMENDATIONS

A VALUABLE report has just been issued[4] on behalf of the voluntary hospitals and district nursing associations undertaking maternity work in the Greater London area; it gives a careful survey of existing facilities for maternity work in London, and makes recommendations for improving them.

HOSPITAL ACCOMMODATION

A maternity service, it is held, should be local in character, and while beds in central London are sufficient, provided they are adjusted to ensure adequate teaching ed towards r London maternity departments at general hospitals. A maternity hospital should have a minimum of 100 beds, and a unit in a general hospital a minimum of 50 beds; where population warrants it, larger units should act as key hospitals for the area. In Outer London a number of appropriately distributed small units should work in close association with key hospitals, which would reserve beds for emergencies and complicated cases. Mothers who had previously had abnormal pregnancies, primiparas, and those with unsuitable home conditions should have first claim on these beds.

All maternity hospitals should have their own pharmacies, X-ray and pathology departments, and should offer adequate facilities for research.

The numbers of private beds in maternity and general hospitals should be increased.

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[1] Tschuprow, Al. A. *Bull. Inst. int. Statist.* 1915, 20, 378.

[2] Russell, W. T. *J. Hyg., Camb.* 1936, 36, 381.

[3] Statistique générale de la France: statistique des familles en 1936. Paris 1942.

[4] T [illegible] ich has to lin istric istri und r eral Y s been Wall r and Mr. J. M. Wyatt, F.R.C.O.G., are members with Prof. T. H. Johnston, M.D., as chairman. It is being circulated with the support of King Edward's Hospital Fund for London and the concurrence of the British Hospitals Association as a basis for discussion with the Ministry of Health and the municipal bodies concerned. The committee's [illegible] 10 Old Jewry, E.C.2.

At least one additional isolation unit, to be situated in South or South-east London, is needed; and every unit should have isolation beds for suspect cases. Cases of abortion should be under the care of a gynæcologist. All maternity units should plan accommodation so as to be able to admit any of their own booked cases which abort; other cases should be fairly distributed between the gynæcological units of voluntary and municipal hospitals.

There should be close liaison between voluntary hospitals and local authorities in planning new accommodation, so as to avoid overlapping.

TRAINING OF DOCTORS AND MIDWIVES

The Royal College of Obstetricians and Gynæcologists consider that medical students should take their midwifery courses at their own medical schools, which means that each teaching hospital should have a maternity unit of about 80 beds. Until necessary building can be completed existing arrangements with LCC hospitals should continue. Provided cases are carefully apportioned there is no reason why the same institution should not undertake the training of both medical students and pupil midwives.

If there is a shortage of domiciliary cases, existing districts at present not recognised for training should be combined into units large enough to conform with requirements. Postgraduate courses for doctors and midwives should be greatly extended at maternity hospitals and general hospitals with maternity units.

ANTENATAL CLINICS

Where a hospital accepts patients from the clinics of a local authority, the expectant mother should be sent to the hospital antenatal clinic for her first general examination, not later than the 32nd week of pregnancy.

The medical officer in charge of the municipal antenatal clinic should have held a resident appointment in a maternity hospital. Arrangements should be made so that the practitioner called to a midwife's case in an emergency shall have seen the patient beforehand and examined her at the 32nd and 36th week. Antenatal clinics should be closely linked with the nearest maternity unit so that special examinations or consultations can be arranged. Health visitor and midwife should cooperate and agree in the advice they give the patient. Dental clinics should be provided in connexion with all antenatal clinics.

DOMICILIARY MIDWIFERY

A patient choosing to be delivered at home by the district service of a voluntary hospital must understand that in need the midwife will call in one of the hospital obstetrical staff. In other cases there should be a rota of doctors who can be called in; they should have examined any of the midwife's cases for which they have taken responsibility.

A home-help service should be available, and resident nurseries for young children of a woman during confinement. Mobile obstetric teams should be available to small maternity units and for the patient delivered at home.

POSTNATAL CARE

Care of the newborn has not kept pace with advance in other aspects of obstetrics. Prof. Chas. McNeil of [illegible] called in to discuss the task of providing [illegible] for the baby in the early weeks of life.

Maternity units should appoint a pædiatrician to work in close association with the obstetric staff. Maternity units should be more generously staffed with nurses. Health visitors should see the mother a day or two before she is due to leave the maternity ward, or at home before the midwife ceases to attend.

The pædiatric staff of the maternity unit should, through the MOH, take some share in the organisation and clinical work of welfare centres; and breast-feeding clinics should be held daily. Postnatal clinics should review the mother's health during lactation. Postnatal and child welfare clinics should be held at the same time and place.

Convalescent homes should be provided for mothers who need extra rest, and should have a toddlers' wing.

A SINGLE UNIFIED SERVICE

Continuity of care and responsibility cannot, it is concluded, be achieved under divided control. An area Maternity and Child Welfare Board for Greater London should be appointed by the Minister of Health, with representation of voluntary hospitals, consultants, general practitioners, county and borough councils (including the MOH's) and other welfare authorities, district nursing associations, health visitors and midwives. There should be a small executive of leisured people, with professional and technical advisory panels. A central bureau for collecting daily information about vacant beds might be its first concern. It is hoped that the scheme will be fitted into the coördinated hospital services which are now the immediate concern [illegible] Fund and the Voluntary Hospitals [illegible].

THE EDUCATION BILL

THE far-reaching measures foreshadowed in the Government's white-paper *Educational Reconstruction* in July are embodied in the new Education Bill, published on Dec. 16 (HMSO, pp. 98, 1*s.* 6*d.* Explanatory memo. Cmd. 6192, pp. 14, 3*d.*). The bill gives the President of the Board of Education full ministerial powers, though he will retain his present title, establishes two central advisory councils for education, one for England, the other for Wales and Monmouthshire, provides for the raising of the school-leaving age to 15 on April 1, 1945, and to 16 as soon as the minister sees fit, and makes part-time education, equivalent to one day a week, compulsory for young people up to the age of 18.

The white-paper promised substantial modifications in the provisions for blind, deaf and otherwise handicapped children made in the Education Act of 1921. The new bill extends the [illegible] now confined to defectives and [illegible] children needing special education, including maladjusted children. An important change is that certification is no longer required before a physically or mentally defective child can receive suitable instruction; no child will be certified as mentally defective while he remains within the education system. Local education authorities will be obliged to provide special education for the less seriously handicapped children in the ordinary schools and for the more seriously handicapped in special schools. The age for compulsory attendance at such special schools will be lowered from 7 to 5 years, and parents of a child over 2 years will have the right to ask for their child to be medically examined with a view to special education. Much of the special educational treatment for handicapped children is now supplied by voluntary bodies, and the bill will enable local authorities or the minister to assist these bodies [illegible]

The bill imposes [illegible] the duty of providing not only for medical inspection as at present, but also for treatment of all pupils at maintained schools and young people's colleges, free of cost. It also makes it a duty of local authorities to provide meals and milk in their schools, and gives them powers to supply boots and clothes for needy children. Independent and direct-grant schools may be included in the arrangements for medical inspection and treatment, as well as school meals and milk, but the expense to the local authority must not be greater than would have been incurred at a maintained school.

The raising of the school-leaving age necessitates changes in the law relating to employment, for the existing acts only refer to the empl [illegible] 14. The bill empowers local [illegible] restrict the employment of any [illegible] auxiliary or special school if it [illegible] or education, so that the restrictions of the Education Act of 1921 can be fitted to the new leaving age. As regards limitation of hours of employment, overtime payments and so on, the time spent at a young people's college will count as in working hours.

DR. DONALD CAMERON, professor of neurology and psychiatry at the Albany Medical College, NY, has been appointed to the chair of psychiatry at McGill University and psychiatrist in chief to the Royal Victoria Hospital, Montreal. Dr. Cameron graduated in medicine from the University of Glasgow in 1924.

In England Now

A Running Commentary by Peripatetic Correspondents

THERE was an old song whose chorus began, "At six o'clock on a shining morn we start our little day"; our newest nursing probationer remembered it when she arrived breathless and breakfastless on Ward X at 0740 hours—precisely a minute late. Excuses? Well, her billet is half a mile from the hospital, she has a cold [illegible] at the top of the house, and unless she wakes [illegible] early, it's just too bad. Breakfast at the hospital is at 7 o'clock—all the nurses take all their meals in the hospital—and at this time of the year it isn't light until 8.30. This little personal problem appeared to be easily soluble when she saw an array of cheap alarm clocks in a local shop, and on her first off-duty spell she went in to buy one. But alas she had to confess that she [illegible] factory worker and came out empty handed. [illegible] Matron, who gave her a chit to say that she [illegible] tal nurse, lived in a billet and had to be at [illegible] at 0700. Even this didn't help; the clocks were for factory workers starting work before 0500. Was the shopkeeper right? Or perhaps nurses are not really essential war workers until they are state registered or perhaps the various Government departments concerned haven't thought of this one. It's a very small one, but these little things count, even in war-time. The days of the "knocker-up" have passed; more's the pity.

* * *

An English-speaking Basuto was recently admitted as a mental patient "NYD." When [illegible]

he heard that she was no longer faithful to him, when he ceased to do so. A few months later he received a letter on behalf of his mother-in-law telling him that she was very angry with him, and had consulted a witch doctor who had "thrown the bones against him"—the acme of local witchcraft, apparently. As he is a Christian he affected not to be disturbed by this, until a few days later when he received a further letter containing a few apparently meaningless scribbles, which he felt sure was a spell from the witch doctor himself. The immediate physical effect of seeing this was an acute pain in his chest and an irresistible impulse, which he satisfied, to run to his major's quarters and fire his rifle several times. This done he sank into a condition of apathy from which it was difficult to rouse him. No ordinary treatment seemed to influence his progress so I consulted the CO of the attached Basuto wing as to the possibility of finding a witch doctor among the various dock pioneer companies who could reverse the spell. He agreed to try, and rather to my surprise wrote an official request to the area commandant that a witch doctor should be available on the following Saturday. A reply was received from one of the companies as follows—

Subject: Voodoo.

> Ref. your memo undated I regret that no witch doctor is at present available in this Group. They are now in short supply—the classes now called up are not so standard—and the only specialist of this subject available has regrettably left his bones behind, without which he cannot fully exercise his art.
>
> (Signed) X Y, Lieut.-Colonel.

A matter-of-fact reply agreeing to do as he wished was, however, shortly received from another company through the [illegible]

[illegible] staff and patients. There was nothing particularly impressive about him—unless it was his girth—and he got up and gave us a moderately smart salute, calling his band to attention, which seemed slightly incongruous behaviour in one possessed of such occult powers. It was disappointing that he had not turned up in paint and feathers heralded by tom-toms. We went over to an empty tent which he agreed was suitable, and through the native medical corporal he was told [illegible] out of the patient [illegible] attendants then [illegible] victim for some [illegible] silently. Then [illegible] bag from his pocket, and slowly took out a Gold-Flake carton containing some white powder, and part of a dried goat's ear. He placed some of the former in each of the patient's nostrils, and we watched the patient in rather tense silence for another 10 minutes. At the end of this he announced through the interpreter that this was the wrong sort of spirit—he was used to those of Bechuanaland, and not those of Basutoland. We asked him whether if he could return another day with a stronger medicine it would be of use, and to please us he agreed to return next day. The CO next appeared with a case of hysterical paralysis of the arm in a young Zulu, and the long period of inspection, with nasal insufflation, was repeated. The witch doctor then said he thought this was a white medicine disease, and not for black medicine. We disagreed, and said that we were sure that he could cure it. He then searched the little bag again, and this time produced a Gillette razor-blade and scarified the affected arm on the back of the wrist, over the external condyle of the humerus, and at the insertion of the deltoid. A red powder was then rubbed in, and the patient was again watched intently. Once more, however, nothing happened, and the patient returned to his ward in triumph. I think paint and feathers would have done the trick.

The job of the twelve attendants, who took no apparent part in the proceedings, is to give a great shout at the first appearance of the offending spirit so that in its fright it will leave the victim. For the second session he turned up without them, which seemed to indicate a defeatist attitude, and this was justified by the uneventful séance. But his powder did succeed on this occasion in making the patient sneeze a good deal, which the doctor said was a very good sign.

As we walked back we wondered whether we are "covering" an unqualified practitioner, or whether the GMO will take the view that witch doctors are "medical auxiliaries." Anyway it has varied the therapeutic monotony of our lives.

* * *

[illegible] at No. 1, Wimpole St[illegible] the English. At the fir[illegible] ssociation of Clinical Pathologists the British were only in a small minority. About ten different languages could have been heard but only English was spoken, and a good English too. The only exception was at the dinner, when a French member insisted, as was his right, on speaking his own language; for many of us it was a joy to hear again such musical words. The meeting was for the dual purpose of scientific discussion and social intercourse, and we all came away with one regret—that the chairman had been bound to work away with his green, amber and red lights to keep the speakers within their short time limit. The dinner the night before had gone off very well; a convivial and friendly atmosphere had been soon established. This was only to be expected from people who have formed themselves into an association whose main aim is to further a spirit of amity and coöperation between the medical communities of Europe. Such gatherings should make more people appreciate how pleasant it is to be a good European.

* * *

Outside the windows of the treatment-room of our young and keen psychotherapist runs a narrow passage where passing patients and nurses used to chat and joke [illegible] rogress of [illegible] chief that [illegible] for a few [illegible] seemed unending. He angrily dashed to the window, but retired quickly when he saw the workmen in lively discussion where and how they should fix the notice: "Silence. Treatment in progress."

* * *

In one of the semi-official social surveys, the examined people had to fill in a questionnaire headed by [illegible] age and sex. The lady social worker was [illegible] embarrassed when she saw a young [illegible] under sex: "Sometimes."

Letters to the Editor

INFANTILE D AND V

SIR,—During the spring and summer of this year, when diarrhœa and vomiting in infants was prevalent, we had the opportunity of observing and treating a consecutive series of cases in a London isolation hospital, and our experiences may be of interest in view of your leading article of Dec. 18.

This series of 120 cases, all under 15 months of age, fell into two groups. In the first group of 61 cases (21 dehydrated) treated between April and mid-August inclusive, there were 8 deaths, giving a case-mortality of 13·1%, or 33·3% in the dehydrated cases. In mid-August the routine of treatment was altered by the early addition of human serum to the intravenous drip. In the second group of 59 cases (27 dehydrated) treated between mid-August and November inclusive, there were no deaths; there was also a striking reduction in the length of stay of these infants in hospital. The main points to be observed are:

1. Detailed examination on admission, including an accurate history.
2. Early recognition and treatment of dehydration.
3. Search for, and early treatment of, infective foci.
4. Nursing in a cubicle or by strict bed-isolation technique.

On admission, all infants are given ½-strength Hartmann's (Ringer-lactate) solution by mouth for 12–24 hours, depending on the amount of vomiting. Vomiting usually ceases within 24 hours, after which the infants are put on a dilute feed, beginning with a 1 : 8 mixture of the milk preparation in Ringer-lactate. We have made it a practice to give the infant the kind of food which he had before admission, unless there is some definite contra-indication. The feeds are gradually increased in strength until the infant is on a full-strength milk diet, usually in 5–7 days.

If dehydration is present, fluid is given intravenously without delay, using a Bateman's needle which is tied into an arm or leg vein after cutting down. At first, ½-strength Hartmann's solution is given, with or without the addition of 5% glucose, and the fluid is allowed to drip rapidly (about 30 drops per min.) for the first half-bottle (300 c.cm.). Pooled human serum is then added to the Hartmann's in equal parts (so as to obtain a half-strength dilution) and the rate of flow slowed to 8–15 drops a minute. As a rough guide it may be said that infants under 3 months require a slow flow of 8–10 drops per min., while older children will tolerate a flow of 12–15 drops per min. But in practice it is necessary to judge each case individually. The rate of flow, and the total quantity of fluid given, needs to be adjusted according to the weight of the baby, the degree of dehydration, the degree of pyrexia if any, and the amount of fluid which the infant is able to take by mouth and retain. The drip is continued, giving alternate bottles of Hartmann's plus serum and ½-strength Hartmann's, until dehydration is completely corrected, the stools are less profuse, and the infant is able to tolerate a dilute feed. This is generally in 1–3 days. If vomiting persists, all feeds by mouth are stopped for at least 12 hours and the amount of parenteral fluid is increased. Feeding is then recommenced with ½-strength Hartmann's as previously described.

If the infant is very collapsed on admission, as may happen with a severely dehydrated baby who has had several hours of waiting in an outpatient department followed by an ambulance journey, treatment is instituted exactly as for "surgical shock." *Warmth, stimulants such as brandy and nikethamide and oxygen are given*, and the infusion is begun immediately. For this purpose, a cutting-down set is always kept ready sterilised. We cannot stress too highly the urgency of treatment in such cases.

This routine and the choice of transfusion fluids are based on the following clinical observations.

1. Most infants with D and V respond well to a preliminary period of starvation, provided it is not too long and that sufficient fluids are given.

2. When dehydration is present, it is essential to deal with it early, since long-continued dehydration may cause irreversible damage, and the chances of recovery appear to [illegible] inverse proportion to the duration of dehydra- [illegible] should point out that with older and fatter babies, in whom the classical signs of fluid-loss [illegible] apparent, there is no wrinkling of the sk[illegible] dehydration with loss of tone and elastic[illegible] obvious if a larger fold of skin (which i[illegible] subcutaneous fat) is pulled up between [illegible] It has also been our experience that pro[illegible] diarrhœa is a more important factor than [illegible] producing dehydration.

3. When dehydration is severe or of long standi the situation is urgent, since there is almost certair loss of plasma-proteins and the condition is akin surgical shock. All workers are familiar with the ty of dehydrated infant who at first responds well to transfusion of saline or Hartmann's, and then develo œdema in spite of the fact that he is still dehydrate Assuming this to be due to lowered plasma-protei it would seem reasonable to give the infant extra pı teins as soon as possible. In practice, it is simpler use a ½-strength solution of human serum or plasma, this obviates the technical difficulty of getting t rather sticky full-strength fluid to run through a sl drip, and also avoids the danger of approaching t unknown point at which tissue œdema begins althou dehydration is not yet corrected. Because there is oft difficulty in getting the drip to start, especially if t infant is very collapsed, it is advisable to begin with t half-bottle of Hartmann's.

It is necesary to pay very close attention to the infa during intravenous therapy; at the earliest sign œdema—puffiness of the hands and feet, eyes, scrotu or vulva—the fluid must be discontinued immediatel There is certainly danger of "drowning" an infant wi too much parenteral fluid, but with careful watchi this can be avoided, and it is still a far smaller risk th allowing an infant to remain dehydrated for a lo period.

It need hardly be said that it is essential to look f and treat any focus of infection. Sulphonamid especially sulphadiazine, were found to be of great val when given early and in adequate do [illegible] attention must also be paid to the ears, and [illegible] and if necessary mastoidectomy, must be perform early.

A prerequisite for success with this simple routine is conscientious and coöperative nursing staff; without t hard work and intelligent collaboration of the sisters a nurses of the barrier-wards in which these infants we nursed, these results could not have been obtained.

Our thanks are due to Dr. W. Gunn, the medical sup intendent, and to Dr. Robert Cruickshank of the Nort Western Group Laboratory for their advice and encoura ment.

M. B. ALEXANDER.
North-Western Hospital, LCC. Y. EISER.

WORK FOR THE DISABLED

SIR,—The Disabled Persons (Employment) Bill three important developments in the formulation policy on rehabilitation. It defines a "disabled person as one "who on account of injury, disease or congo deformity is substantially handicapped in obtaining keeping employment or in undertaking work on his account, of a kind which apart from that injury, disc or deformity would be suited to his age, experience qualifications"—a definition which can be comp with that of the Danish Invalidity Law which adop as its standard inability to earn more than one-third the wages normally earned by an ordinary individ of comparable status without disability. The bill provision for the preparation of a register of disab persons and it lays down machinery whereby employ with more than 25 workpeople may be compelled to employment for a quota of men whose names appear that register. And the Minister may, after consulta with employers and workers, reserve certain classes work for the exclusive employment of registered perso These far-reaching principles open up a new approach the welfare of disabled persons who are now to [illegible] "under adequate medical supervision and under [illegible] stances conducive to the *restoration of fitness*" [illegible] for physical training, exercise and occupation [illegible] the direction of a National Advisory Council with a [illegible] of district advisory committees.

Wisely used, these provisions should go some way towards the recognition of the fundamental importance of medical skill and interest in the well-being of the disabled. But it is a pity not to have brought in, besides the pooled experience of interested individuals and societies, the whole weight and authority of the government departments concerned with social medicine and education. There was a great opportunity here of doing something tangible towards the provision of a really comprehensive health service for members of the community who badly need its care, and it would be an act of statesmanship on the part of the Minister of Labour to make it clear that it is his intention to approach the rehabilitation of the disabled along the broadest possible lines. That, as your leading article last week set out so convincingly, is the essential thing. Don't label disablement, get your man fit enough to forget it. The issue cannot be tackled successfully as a purely industrial one.

ARGUS.

QUIZZING THE PHYSICIANS

SIR,—The interim report of the social and preventive [illegible] committee of the Royal College of Physicians of [illegible] (subject of a leader in your issue of Oct. 30) is [illegible]resting document, apart altogether from its [illegible] value as a contribution to medical education. The synchronisation of its publication with that of the College's committee on psychological medicine throws into prominence the curiously differing constitution of the two committees. The latter, for instance, has 20 members, compared with only 13 on the former, but the most striking difference is the paucity of clinicians, and especially consultants, on the social and preventive medicine committee; there are 3 MOH's, 1 professor of public health, 1 American attached to the Ministry of Health, 1 whole-time member of the scientific staff of the MRC, 1 whole-time professor of medicine and 1 statistician. What is the significance of this? Lack of interest of the clinicians in the subject seems the obvious reply, though perhaps there is some more subtle explanation. However that may be, perhaps the paucity accounts for certain features of the report.

As a clinician I [illegible] the statement that "Social [illegible]tively novel point of view," [illegible]age the committee define the [illegible]lum in preventive medicine [illegible]at to the study of man in his [illegible] or patient in relation to his [illegible]al background." What on earth have some of us been teaching for years to our students except this very thing? What would have been left of our teaching if we had had to omit all reference to the influence of working and home conditions on the patient with a peptic ulcer, or of housing on the rheumatic child?

In the proposed curriculum there are several curious suggestions, presumably arising out of the attempt to be "intensely" practical, but resulting in a rather unbalanced programme. Climatology may not be of immediate importance to the student, but it is certainly a subject he should know something about. Similarly the rather scathing comments on genetics are more than surprising these days, and I can conceive of no part of the curriculum in which instruction in this vital subject could be more satisfactorily included than in social medicine. Equally surprising is the suggestion that such important subjects as ventilation, sanitation, &c. should be more or less ignored.

[illegible] intment at the lack of [illegible] Perhaps we have been [illegible]

Finally I must pick a bone with the committee in their delineation of the qualifications of a professor of social and preventive medicine. "A brief clinical experience" [illegible] training in public [illegible] lth work" and [illegible] public health activities," and, while "interest and training in research are highly desirable, . . . it is considered immaterial whether this training be in epidemiology, bacteriology, nutrition, child health, social science, or in a field like tropical medicine." Not a word about clinical science. Many of these desiderata are admirable, but, at least in these days of transition, a sound clinical training both in research, practice and teaching is surely the first essential of such a professor. Unless he has such a background he will never be able to teach "medicine" of any description, he will never adequately appreciate the problems of individual patients and their reactions [illegible] s important as [illegible] the cooperation [illegible] the experienced clinician, and his training is such that he could very easily assimilate these subjects and knit them into a single whole. The public health administrator, however, will seldom attain this ideal because the vital aspects cannot be learned from the books, but only as a result of long and often bitter training in the hard school of clinical medicine.

BEDSIDE TEACHER.

THE GOVERNMENT AND THE PROFESSION

SIR,—The letter in your issue of Nov. 20 might give a wrong impression of the views of the medical practitioners of the Highlands and Islands area of Scotland. Dr. Leys, [illegible] northern counties of [illegible] Islands [illegible] of his [illegible] health [illegible]ing them [illegible] did not circularise [illegible] but only a selected [illegible] of the local division of the BMA, the president of the Northern Counties Branch of the BMA, &c., men whose names as signatories to his letter, if they approved of it, might give it an appearance of representing the views of the area. Not a single practitioner or medical official in the counties of Caithness, Sutherland, Ross-shire, or Morayshire signed this letter, nor do we find the Orkneys, Shetlands or Hebrides [illegible] nor the Burgh of [illegible] r central hospital, [illegible] Dr. Leys himself. [illegible] by two general [illegible] four from the Islan[illegible] more Highland-like letter if Dr. Leys had given your readers, even as a parenthesis, a list of those colleagues who refused to sign his letter, and also, to save paper, just the number of medical practitioners and medical officials in the Highlands and Islands area whom he did not circularise? The bracketing of places of residence after the names of the signatories is likely to mislead.

We have a very fine national service in the Highlands and Islands, a service applauded by the League of Nations and by the many from the Dominions and abroad who have visited us. A meeting was recently held in Inverness open to all practitioners within the Highlands and Islands area. It was the duty of all who wished our service changed to be there and to state their views. It was one of the largest meetings of medical men and women ever held within our area, with representatives from all our northern counties. Not a single person present asked for a salaried state service under local authorities. All felt that to be dominated by local authorities would be the ruination of our se[illegible] We appointed a delegate to meet the powers [illegible] in Edinburgh. After the Secretary of Stat[illegible]

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* The psychological medicine report says: "this teaching must be limited . . . it must be solid, because the student is too raw to be able to profit by debatable speculations about human nature." And yet we consider ourselves a well educated profession! What about these same students' contemporaries in other faculties studying, and understanding and discussing, the intricacies of philosophy, logic and mathematics? Are they too raw to profit by "debatable speculations about human nature?" Must they be forbidden Plato, Socrates, Hume, Berkeley and Kant and confined to [illegible] by their tutors? [illegible] on of the College [illegible] students?

Leach's statement, Dr. Leach was assured that the identity and character of our service would be maintained. A week ago we had a meeting of elected representatives of the Highlands and Islands subcommittee of the BMA, with representatives from Caithness, Sutherland, Ross-shire, Inverness-shire, Argyll and the Burgh of Inverness. Every person present agreed that our service should be maintained as at present, and valuable suggestions were put forward for its further improvement. This is not the opinion of medical practitioners alone; it is the opinion of the people whom we serve. We do not wish our service ruined, or even belittled by people who know nothing of our past, our sufferings, and what this service has meant in giving hope to our people, and relieving them of much of the suffering that their forbears had to go through. We have a service of which we are proud to be members in spite of our isolation.

Tain, Ross-shire. ENEAS K. MACKENZIE.

FEEDING WITH AMINO-ACIDS

SIR,—Your editorial on feeding with amino-acids (*Lancet*, 1943, i, 143) has provoked discussion, and one of the authors mentioned therein has already taken exception to your comments (*Ibid*, 1943, ii, 275). As the first one to use amino-acids in the human as a method of intravenous protein alimentation, I was struck immediately with the fact that your leader seemed to misunderstand many fundamental considerations regarding parenteral therapy and about clinical research in this country. While my first impulse was to take up these misunderstandings in turn, I would prefer to express rather my personal pleasure at the publication of this editorial because it means that this new therapeutic procedure, which was started in this country nearly 5 years ago, has already been deemed important enough to be discussed (though somewhat belittled) by our esteemed English contemporaries.

Parenteral injections have perhaps reached a wider use in this country than elsewhere, although their value in lowering surgical mortality and minimising surgical complications is recognised everywhere This is true because such injections not only correct serious biochemical deficiencies but actually meet several daily nutritional needs of patients temporarily unable to take anything by mouth or in whom the oral ingestion of fluid or food would prove deleterious. The addition of appropriate amino-acid mixtures to the four other nutritional elements now extensively used enables the surgeon to avoid many of the deleterious effects now known to follow protein deficiencies, particularly post-operative hypoproteinæmia. In fact, this new procedure is a physiological short-cut, circumventing the need for the gastro-intestinal tract so often temporarily out of commission. Plasma transfusions, true enough, may also be used to give parenteral protein nourishment and have many advantages, particularly in acute hypoproteinæmia, but are scarcely as physiological, nor as inexpensive or convenient, as an injection of an appropriate mixture of amino-acids. Amino-acid mixtures have also been given by mouth but only to spare digestion, which is so necessary if whole protein food is to be absorbed, and is occasionally impaired, for example, by pancreatic achylia and nutritional œdema of the gastro-intestinal mucosa.

School of Medicine,
Washington University, St. Louis. ROBERT ELMAN.

OXFORD VAPORISER

SIR,—I fear the brevity of my report[*] has persuaded Wing-Commander Soper to misread between the lines in some places. The cases dealt with were of a particular class—namely, prolonged and often repeated operations on men who had sustained recent severe wounds. I do not consider ether the *ideal* anæsthetic for these cases, although at the time it was the best available. Nitrous oxide and oxygen in a closed circuit, with cyclopropane or ether as adjuvants, would have been preferable. I tried to point out how the use of the Oxford Vaporiser minimised the disadvantages of ether, rendering insufficient to outweigh the advantages of portability. Soper suggests premedication two hours before operation; I have found one hour most likely to bring about amnesia. Moreover a dry mouth for two hours in a hot climate is very uncomfortable, and shortage of nursing made two injections impracticable. "Unpleasant" is a relative term and I wonder if Soper's grateful patients would not have been even more grateful for an inductic with 'Pentothal.' When I used a chloroform-eth mixture during induction the average amount of chlor form used was two drachms, administered on an ope mask held an inch or two from the face. quantity of chloroform thus absorbed was tide over the difficult transition. During the very bu period covered by my report (we might be 18–20 hours a day) time was of major impo on the occasions when I decided not to use a little CO_2 helped to speed up the inducti oxygen, the two best prophylactics against the tox effects of prolonged ether (or chloroform) are, in m experience, glucose and excess oxygen.

At the end of my report I compared the Oxfo vaporiser with the "tin can" vaporiser, because seve anæsthetists in the Middle East had suggested that t latter was just as good. I have used th running more than one table with only on I have found that if the tube connecting patient is narrow there is too much breathing; if, on the other hand, the tube is wide the is a dead space with accumulation of CO_2 and hea breathing which may exhaust the patient.

M. RUSHTON.

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[*] Captain M. Rushton's article in our issue of Oct. 23 (p. 509) was incorrectly ascribed to Mr. MARTIN A. RUSHTON, B CHIR, LDS, attached to the plastic and jaw centre at Park Prewett Hospital, Basingstoke. A correction of this regretted slid appeared on p. 572 of our issue of Nov. 6 and we take the [illegible]ity of repeating it here.—ED. L.

Parliament

ON THE FLOOR OF THE HOUSE

MEDICUS MP

THE House has adjourned for the Christmas recess i a state of expectation. Expectation of the opening the second front as a result of the Moscow and Tehera conferences, expectation of great legislative prospects o our reassembly, expectation of political repercussion vague and indefinite it is true, which may come upon u during the next series of sittings.

The news of the Prime Minister's illness at this junctu is disturbing and all medical members were cros examined on the precise nature of the pneumonia of th left lung. The House wishes Mr. Churchill very we and hopes his robust constitution and remarkable vitalit will enable him to overcome this attack rapidly an completely. But the House also hopes that the Prim Minister will take a reasonable length of convalescenc before returning to full work.

Mr. Eden's statement on the war situation no new facts because all that can be said of strategy has already been said in the communiques o Moscow, Teheran and Cairo. The Teheran conferenc settled times, places and dispositions of military effort by land, sea and air, and these will be communicated t the enemy in due course—on the field. The full gla of the war searchlight has been turned on the Far Easter field of operations, and the greater concentration o China, now a major factor in strategical dispositions involves a further drain on the world's medical resource But China may overcome her deficiency in numbers o medical personnel by instructing her educated and highl adaptable people along the lines of medical trainin found effective in the British and Dominion forces durin the war. China has vast armies and they must b served.

When the House reassembles in the New Year one o its first duties will be a two-day debate on the Educatio Bill, the text of which has just been published. It is a long document running to 97 pages, with 111 clauses an 9 schedules. Provision for the examination of requiring (or likely to require) special educational treatment will show the education authorities in all areas extent of their liabilities more fully than at present The facilities for medical treatment of school-childre will need to be extended as it becomes the duty of every authority to make “such arrangements for securing the treatment” as are necessary, provision of “milk, meals and ot so definite, as they await the of the discussions on the Beveridge proposals for 's allowances. In announcing interim decisions on the Beveridge repo ment stated that they or children's allowance milk and meals in school in place of part of the amount suggested. Clause 17 in the new bill, which deals with milk and meals, does not make this point clear and is certain to arouse controversy. It has been an article of faith with many educationists for a long time that one satisfactory meal should be provided for every child in d f public moneys. The school- ed to 15 in 1945—unless it is for raising the leaving age to 16 is brought nearer than it was. All schools whether privately owned or otherwise will in future, almost certainly, be subject to inspection, and it would be an advantage to extend arrangements for periodic medical inspection and routine clinic to all schools, for in this respect private schools (including some of the celebrated “public schools”) are at a disadvantage compared with the council schools.

On one of the last sittings Sir Frederick Sykes, who is chairman of the Miners Welfare Commission, gave an encouraging account of their activities. Many pit-head baths have been completed and 419,116 men (57% of the total) are now served. Canteens have helped, but the nutrition of miners will not be maintained at an adequate level unless, in some areas at least, the men get extra rations. Sir Frederick is soon to open a new rehabilitation centre at Talygarn for the South Wales, Forest of Dean, Somerset and Bristol areas, and he told the House that two centres are already in operation and five in preparation. The difficulty is to get medical officers and staff.

Infectious Disease in England and Wales

WEEK ENDED DEC. 11

Notifications.—The following cases of infectious disease were notified during the week; smallpox, 0; scarlet fever, 2561; whooping-cough, 1611; diphtheria, 634; paratyphoid, 2; typhoid, 5; measles (excluding rubella), 414; pneumonia (primary or influenzal), 2956 (last week 2301); puerperal pyrexia, 162; cerebrospinal fever, 77; poliomyelitis, 11; polio-encephalitis, 0; encephalitis lethargica, 1; dysentery, 166; ophthalmia neonatorum, 66. No case of cholera, plague or typhus fever was notified during the week.

Deaths.—In 126 great towns there were no deaths from enteric fever or scarlet fever, 1 (0) from measles, 11 (2) from whooping-cough, 11 (2) from diphtheria, 44 (7) from diarrhœa and enteritis under two years, and 1148 (128) from influenza. The figures in parentheses are those for London itself.

Manchester reported 3 deaths from whooping-cough. There were 10 fatal cases of diarrhœa at Birmingham.

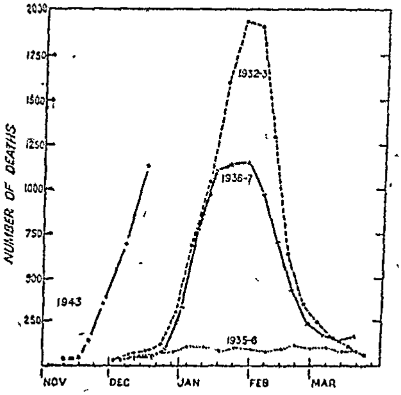
The number of stillbirths notified during the week was 199 (corresponding to a rate of 33 per thousand total births), including 23 in London.

Messrs. CIBA Ltd. have published a new edition of their handbook *Nupercaine* Nupercaine' *Handbook.* rors which for spinal may lead to failure, and the reasons for postanæsthetic complications. Part 2 deals with surface, infiltration and regional anæsthesia and gives tables of dosage and some account of the chemistry, physics, pharmacology and toxicology of nupercaine. Copies will be sent to doctors on request.

Public Health

THE INFLUENZA EPIDEMIC

AFTER another week the epidemic retains its character of a widespread nuisance. The Ministry of Health has quoted some figures from abroad: 90,000 cases at Washington, 32,000 at Milan, half a million in Berlin. Some indication of its extent in this country has been given by official statements that one railwayman in ten has been off duty and that the call-up of pharmacists and dispensers has been postponed. Life has been very hard, especially in isolated homes, and the local colour in many hospitals and institutions has been sombre. But no alarm has been felt, and it may not be improper to apply to the nation in its transient illness the noble words of the *New York Times* last week about the Prime Minister: “We do not get the picture of a sick man, but of a man stoutly contending with an adversary.” The week's toll of deaths has risen to 1148, only 7 short of the 1936–37 peak; but the multiplier on the previous week has fallen to × 1·6, and the mortality has remained chiefly in the later decades of life, the London figures of age incidence being 1-0-1-0-1-2-4-0-22-41-47. Another week should see us near the peak, without approaching the level of 1932–33 (and remote indeed from the 7537 deaths for the week ended Nov. 9, 1918). That the drop will be as rapid as it was in 1933 is less certain, with the winter for the most part still before us. Judging by the R.G.'s return, the let-up in the Northern area continues, some further rise in London and the Home Counties is to be expected, and for the Midlands we may hope that the story of Birmingham, which follows, is nearly completed. We should of course not forget that by the time someone has succumbed to an attack his (say) 1000 more fortunate contemporaries are mostly back at work. Deaths, as the Ministry puts it, fall more slowly than cases; and as influenza is not notifiable we can only at cases.



Weekly Deaths from Influenza in the Great Towns of England and Wales

Week ended	AGGR.	Lond.	Grtr Lond.	NORTH	MIDL.	Manc.	B'fd	B'hm	B'tol
Nov. 13	46	6	16	19	13	4	2	2	4
20	106	10	16	56	24	4	7	1	9
27	375	29	71	172	91	44	17	20	13
Dec. 4	709	72	181	288	157	47	11	57	16
11	1148	128	349	449	248	62	28	73	22

Local Colour: Birmingham

THE Medical Research Council, through its Industrial Health Research Board, will shortly be issuing a sickness-recording system for the use of industry as a whole. Unfortunately this will not be ready for use at the beginning of the new year. When it is generally adopted we shall, for the first time, have morbidity figures for the working population. Mortality-rates have so far been the only index of health. Epidemics emphasise the need for accurate and integrated sickness records. Thus some 6500 factories, shops and offices contribute to the Hospitals Contributory Association in Birmingham, and a questionnaire would have to be sent to each of these, and replied to, before the extent of the present influenza epidemic among the workpeople there could be judged.

An industrial medical officer who spends his whole time going about factories in the city thinks that so far influenza has only slightly interfered with production, and then mainly in the smaller firms where key men are off work. In his view the public, especially those who do not remember 1918, do not yet realise the potential significance of an influenza epidemic, though factory managements are now showing some concern at the possible stoppage of work. He has seen clear evidence of the influence of working conditions on absence rates; where factory hygiene is good and overcrowding minimal there is less risk of spread; in one factory where both personnel and plant are overcrowded 20–25% of the workers have been down with the flu.

Taking an average over the year, the sick-absence rates in Birmingham factories stand at around 2–4% for men and 5–6% for women. The rates at present show about a threefold increase, with absences of 12–15%. Some firms keep a weekly analysis of sickness-benefit claims, which shows the number of people off duty with each ailment, but not the time lost. In one such works, employing 5000 men and 5000 women, the sickness claims listed under influenza for the four weeks, Nov. 20, 27, Dec. 4, 11, were 22, 55, 72 and 49 for men, and 17, 53, 61 and 35 for women.

Among the remedies used in Birmingham factories are gargling, spraying of rooms, and the use of ultraviolet light, but very few seem to know anything of aerosols, oiling of floors and so on. The Ministry of Health mask, recommended so strongly two years ago, has not been taken up, mostly because workpeople hate to think they look foolish. The industrial medical officer already quoted maintains that the most important preventive measure as far as industry is concerned is the diminution of fatigue by reducing hours of work. The workman is naturally averse to reducing his hours and therefore his wages, and as a result men in the heavy industries in Birmingham are still working 65–80 hours a week. The maximum hours for women, 54 per week, are often being worked, in addition to home duties.

HOSPITAL EXPERIENCE

An EMS hospital admitting Service and civilian sick from the Birmingham area, as well as patients from the wards of the city hospitals, noted a sharp rise in admissions of acute respiratory infections beginning on Nov. 17. The influenzal cases admitted were mostly mild, the predominating symptoms being headache, backache, general aching of the limbs, coryza, often with long paroxysms of sneezing, moderate sore throat and slight cough. Temperatures from 100° to 103° F. The patients were flushed, with conjunctival injection, coated tongue, and injected pharynx. The lungs were either clear or exhibited a few scattered rhonchi. Symptoms and fever usually lasted 24–36 hours, and rarely more than 48 hours after taking to bed. The patients were allowed up when their temperature had been normal for 18 hours, and were mostly fit for discharge 10 days after admission. This hospital admitted 23 cases of bronchopneumonia and 1 of lobar pneumonia during November. All except one of these responded well to sulphamezathine; the one exception being probably a case of atypical pneumonia in which the temperature fell by lysis during the 6th to 8th day after admission. The only complication encountered was a pleural effusion in a woman of 22. Most of this hospital's cases were in young adults; there were no deaths.

Nurses have been badly hit by the epidemic. Up
the second week of December the numbers affected
Birmingham hospitals were roughly as follows:

Hospital	*Nurses*	*Affected*
General	206 ..	50
Dudley Road	426 ..	57
Queen Elizabeth	456 ..	50
Selly Oak Hospital ..	250 ..	45
Selly Oak Infirmary ..	380 ..	63
Children's	110 ..	10

These figures probably include some common colds. Among the 50 nurses affected at the Queen Elizabeth
Hospital, rigors were recorded in 26 cases, pyrexia over
100° F. in 57, headache in 47, backache in 37, and coug
in 37; the average duration of fever was 2–3 days, an
the average stay in bed 4·7 days. Sinusitis developed i
2 of the nurses, and conjunctivitis, bronchiolitis, otit
media and tonsillitis each in 1. Pulse-rates often fe
sharply before the fall of temperature, and 18 cas
showed a bradycardia of 60 or below per minute.

The school medical officer reports that for Novembe
the attendances at the elementary schools were only 4
below the average. This confirms the experience at t
Children's Hospital, where out of 54 admissions to t
medical side in the three weeks up to Dec. 11 only
were labelled upper respiratory infection, compared wit
9 out of 52 admissions for the same period of 194
About half of the 10 admissions were probably for con
plications of influenza, though without a family histor
this would not have been detected. On the other han
about half of the children in the hospital's day nurseri
are said to be affected, and about a third of the nurse
staff. At the Ear and Throat Hospital the number
children requiring paracentesis has doubled, compare
with normal times; these cases have cleared up i
outpatients without complications. There has also bee
a definite increase in acute suppurative otitis media i
adults.

At the General Hospital, among 19 cases of influenz
pneumonia seen by one physician there have been
deaths. The women with pneumonia all told the sam
story—battling with a cold for some days to keep t
home going, and a sudden chill while standing in a sho
ping queue. Two of the fatal cases—a young man an
a middle-aged woman—showed heliotrope cyanosis; t
third was in a woman near term with her fourth chil
The pneumonia in these 19 cases was unaffected b
sulphonamides; physical signs were slight but X-ra
shadowing sometimes surprisingly dense. The ons
was sudden, temperature often 104° F., headache sever
pleurisy rare, cough slight if no previous bronchiti
sputum scanty and only occasionally bloodstaine
Defervescence was gradual.

At Selly Oak Infirmary, of 19 patients who died
influenza during November and the first week of Decem
ber, there was one aged 11 weeks and others aged 2, 2
28, 34 and 44 years; the rest were people well over 5
with previous lung damage, such as chronic bronchiti
fibrosis of lung or bronchiectasis, or with such conditio
as diabetes. Autopsies showed the typical angr
redness of the trachea and main bronchi, and hæmo
rhagic areas scattered over the lung fields. The hea
muscle looked unhealthy in every case.

SHIP-BORNE SMALLPOX

A SHIP from North Africa arrived in a West Scotti
port on Nov. 24 with a case of confluent smallpox o
board, a soldier, aged 23. He had sickened on Nov. 1
and had been admitted to the ship's hospital next day
and was diagnosed smallpox on Nov. 19, thereafter bei
isolated in one of the cabins adjacent to the hospital
This cabin was entered from an alleyway, with access to
through the ship's hospital. The patient had bee
vaccinated, unsuccessfully, on Aug. 5, 1942, this bein
his first vaccination.

The ship had a crew of about 200 along with 14
other personnel, and carried a full complement of pas
sengers—3500, including about 400 marine survivo
comprising Dutch, Javanese and British, along wit
others. When the case occurred there was only sufficien
lymph on board to vaccinate about 100 of the immediat
contacts. On its arrival, the ship was detained at th

anchorage, and arrangements made to inspect and vaccinate everyone on board. This procedure was completed on Nov. 21, the date of arrival of the ship. It was obvious, however, that vaccination at that stage would offer insufficient protection on any susceptible persons who might have been exposed to infection during the earlier period of the patient's illness. The ship was full to capacity.

These factors largely determined the subsequent measures that were taken, with the full consent and coöperation of the regional port director and other authorities concerned, the aim being to secure adequate surveillance for a period of 14 days after the removal of the patient from the ship to the smallpox hospital ashore. With this end in view, the following measures were adopted.

1. The ship was detained at its anchorage and not permitted to proceed to its original destination.

2. The passengers were disembarked on Nov. 26 after reinspection, appropriate instructions for surveillance, to end on Dec. 8, being issued by the authorities. A few who were on a different deck and unlikely to have come into contact with the patient were allowed home. Their addresses and the location of the station to which the passengers went were notified to the health authorities of the districts.

3. All others were kept on board, including (*a*) a group of 30 men whose previous vaccinations were judged to be unsatisfactory by the inspecting medical officers, (*b*) the 42 inmates of the ship's hospital, (*c*) the marine survivors, and (*d*) the ship's crew.

4. Finally, on Nov. 27 and 29, those in group (*b*) were removed to hospital ashore, while those in groups (*a*) and (*c*) were transferred to a station in the country, where they were detained under observation until Dec. 8—i.e., fourteen days after the case of smallpox was removed from the ship. The reason for clearing the ship of all except the crew was to enable the vessel to go to sea; none of the crew was allowed ashore before the ship sailed.

These precautions amounted to a frank imposition of quarantine. The salient facts ascertained when the ship arrived were that the patient was in his ninth day of illness, in the confluent stage of smallpox; vaccination of passengers and crew when the case was diagnosed on the ship had been possible only to a limited extent owing to lack of lymph; and the case had occurred under conditions of close contact which obtain on a crowded ship. Further, the general revaccination carried out when the ship arrived could not be regarded as an adequate precaution; consequently, the problem resolved itself into one of surveillance under circumstances which would allow of proper daily medical supervision, a view which was accepted and acted on by the authorities responsible for the movements of the ship and of the personnel on board.

These were the main reasons for the steps taken in this case, but the decision to adopt them rested also on previous experience last year. On May 29, 1942, a ship arrived in the Clyde, when a member of the crew was found to be suffering from confluent smallpox, diagnosed as measles, the rash appearing on or about May 24. As subsequent events revealed, the infection had already spread among the crew and to the passengers, both directly and indirectly, while general vaccination of those on board did not in fact prevent the outbreak which subsequently took place. During the course of this outbreak, instances occurred where contacts contracted smallpox, although successfully vaccinated during the early days of the incubation period of the disease.

Thus, the situation on the two ships was similar in that each had on arrival at the port a confluent case of smallpox on board, the patient being approximately at the same stage of the illness—the ninth day. In neither case had general vaccination been carried out on board until port was reached, because on the former ship the real nature of the illness was not recognised and on the [illegible] ther present ship there [illegible] was [illegible] hand, the isolation [illegible] much better, but the risk from [illegible]

As regards the subsequent story, none of those who were isolated ashore or in hospital has since contracted smallpox. It is not possible to give an accurate account of the previous vaccinal history of all on board. As explain [illegible] 30 in all [illegible] officers [illegible] to the [illegible] survivo [illegible] station showed that a good response to vaccination was obtained as regards (*a*) 21 out of the above 30 with unsatisfactory previous records; (*b*) in 9 out of 38 others, and (*c*) in 13 out of the 121 Dutch survivors, apart from a considerable number in these groups in whom there was a modified reaction. These results indicate a degree of susceptibility among the contacts.

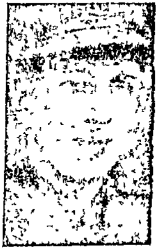
There is no precedent in recent times for the policy of quarantine adopted. The steps to be taken on the arrival [illegible] are vaccinated and allowed to proceed to their shore destinations, surveillance there being the duty of the local health authority. This has been the invariable practice hitherto at all ports in this country. But the regulations themselves as drafted can be interpreted as giving wider discretionary powers to the port health authority. This incident again raises the question of protection by vaccination of those who travel from infected countries to home ports.

Obituary

HUMPHREY BARRON THOMSON

MB BELF; CAPTAIN RAMC

Captain Humphrey Thomson, who had been reported missing, is now officially recorded as killed in action during December, 1941. From the meagre accounts which have filtered through from the Far East it appears that the battalion of the regiment, to which he had been posted, was holding part of the border between Malaya and Thailand. The regimental aid-post established somewhere near Alor Star was attacked and wiped out by the Japanese in the early days of their invasion. The sergeant of the unit escaped and reported that Captain Thomson was killed in this assault.


Henri, Belfa

The only son of Prof. W. W. D. Thomson, FRCP, of Belfast, Humphrey Barron Thomson was born in 1916 and educated at Elm Park and Campbell College, Belfast. He qualified from Queen's University in 1939, and after six months in the Royal Victoria Hospital as house-physician to Dr. Boyd Campbell and as house-surgeon to Mr. Howard Stevenson, he joined the RAMC. Shortly afterwards he volunteered for service in the Far East and before he left he married Miss Mary Glendinning, of Island Reagh, Comber, co. Down. On arrival in Malaya he acted as medical officer in the military hospital at Singapore till he was posted as a regimental medical officer.

Humphrey Thomson was full of the joy of life. His wit and humour, his high ideals, and his out-spoken championship of what he considered right won the regard and affection of his contemporaries, while his kindness of heart and old-world courtesy endeared him to the [illegible] the last to claim [illegible] book knowledge [illegible] n ideal niche for [illegible] se. His success was also due to the absorbing interest he took in his patien[illegible] and women rather than a[illegible] obeyed the Hippocratic [illegible] sion the physician should [illegible]

DR. BURTON WOOD

N. L. R. writes: It was my good fortune in recent years to be closely associated with Dr. Burton Wood in his work at the London Chest Hospital. His loss to the hospital and to his colleagues is very great. He gave neiously of his knowledge and experience of respiratory medicine and the lessons learned from his method of approach to clinical problems are abiding. He never relied overmuch on the stethoscope, but was able to get more accurate information from a skiagram than most men, while his power of description and choice of words enabled him to impart his findings to others. He was not, however, exclusively, or even predominantly, "radiologically-minded": he was a shrewd clinician in the broadest sense, giving due weight to the history and frequently using with advantage for diagnosis and prognosis the physical characteristics and mental reactions of a patient. Fine physician and brilliant speaker though he was, it was in an armchair round the fireside that Burton Wood excelled. In this intimate atmosphere he delighted to discuss a wide range of subjects and his guest would always leave wiser than he came.

Notes and News

RED SQUILL FOR RATS

Blue squill charms the eye with its inflorescence, its white *bulb comforts the bronchitic, and the red* variety demolishes *rats; so that man has reason to cherish* and admire the little lily. Among rat poisons red squill stands high; Dr. Morgan's total war on rats, described in this column last week, commended its use, "if you can *get it.*" *Of late none has been* available from Sicily or Malta. Arsenic and zinc phosphide are plentiful, and are good poisons if properly used, but some think that results could be achieved more quickly with strychnine—a painful and undesirable poison not at present permitted. Rats have been breeding fast in the dock areas, and the Pharmaceutical Society have been considering whether *they should ask Mr. Herbert Morrison to release* strychnine for killing them. Fortunately this should not be necessary. A cargo of red squill has arrived from North Africa and another is expected. Defestation of the dock areas and warehouses will be hastened by this well-timed argosy.

University of Cambridge

On Dec. 11 the degrees of MB, B CHIR were conferred on J. R. Handforth by proxy. At recent examinations the following were successful:

Part I: surgery, midwifery and gynæcology.—M. S. Adams, C. G. Attenborough, H. H. E. Batten, T. S. L. Beswick, P. L. Blaxter, K. A. C. Bowen, D. Brazier, D. W. Burnford, J. D. Burton, I. J. Carré, I. R. Clout, A. Comfort, R. P. Cook, P. J. Coope, P. B. S. Cooper, P. D. B. Davies, C. D. Drew, E. D. Dyson, R. D. Eagland, [illegible] I. Epstein, D. M. Evans, M. Farquharson, [illegible] 'loyer, P. H. [illegible] 'ullerton, [illegible] Giles, M. T. ([illegible] . C. R. H. [illegible] . C. E. Hartle [illegible] V. Hicks, [illegible] . B. Holmes, N [illegible] . Hunter, [illegible] Irvine, D. G. James, M. C. Joseph, E. M. Kingsley-Pillers, A. G. Leatham, J. Lorber, P. F. Lucas, D. W. R. Lyle, M. B. McIlroy, I. L. McKelvie, R. M. MacPhail, I. A. Magnus, [illegible] Matthews, P. D. Mort, M. W. L. Mutch, K. N. V. [illegible] atterson, *J. C. R. Payne, P. B. Philip-Smith,* [illegible] D. G. Pugh, K. E. E. Read, M. K. E. Reancy, [illegible] J. Roche, L. J. Rowley, R. C. Roxburgh, [illegible] Schofield, F. D. Schofield, H. F. Sebag-Monte- [illegible] F. N. Sidebotham, K. W. Symons, M. Symons, [illegible] H. M. Tilley, M. M. Tunstall-Behrens, R. G. [illegible] R. D. Vanstone, D. G. Veater, N. T. Welford, [illegible] J. Whitfield, A. P. Wingate, R. A. Womersley, K. A. A. Wray, G. S. Yeoh.

The board of research studies has approved Dr. Dorothy Russell for the title of the degree of D Sc.

Medical Awards

The following awards have been made in recognition of gallant and distinguished services in Burma and on the eastern frontier of India.

CBE.—Colonel Bijitendra Basu, OBE, IMS.

OBE.—Lieut.-Colonel C. F. J. Cropper, BA OXFD, MRCPE, IAMC; Colonel Charu Chandra Kapila, MRCP, IAMC; Colonel J. A. Mathison, MB, RAMC; Colonel Manfred Morris, MD MANC., RAMC; Lieut.-Colonel Victor Perez, MD LOND., RAMC.

MBE.—Major G. D. W. Adamson, LRCPE, RAMC, Asst. Surgeon (British cadre) A. V. Barker, IMD; Captain J. B. Hurll, MB GLASG., RAMC; Major J. S. Kerss, MB EDIN., RAMC; Captain J. G. Scott, MB DURH., RAMC; Subadar V. D. Sharma, IAMC; Major J. F. Shepherd, FRCS, IAMC; Subadar C. Singh, IAMC; Major L. S. F. Woodhead, MRCS, IAMC.

DSO.—Lieut.-Colonel G. R. Marshall, MRCS, RAMC.

MC.—Captain N. P. Mahapatra, MB., IAMC.

By permission of the Privy Council the name of the Chartered *Society of Massage and Medical Gymnastics has now* been changed to The Chartered Society of Physiotherapy.

University of Manchester

At recent examinations *the following* were succ

O. E. Adeniyi-Jones, J. R. Archibald, Margaret A. Kathleen [illegible] Burke, Margaret A. Bur Clarkson, [illegible] Gregory, E. J. Guest, Jacl liffe, C. L. [illegible] herwood, G. W. H. Jame Johnson, [illegible] McK. *Laslett, Alan,* B T. M. Ma [illegible] J. F. O'Grady, Arthur F. C. Reid [illegible] Sharp (with distinction in and medic [illegible] avers.

King Edward's Hospital Fund for London

The Duke of Gloucester speaking from the chair at a of the Fund on Dec. 14 announced that £280,000 wa *being distributed among the* voluntary hospitals. A grant of £5000 had been made to St. Thomas's to he expenses at its country branch at Godalming whic indirectly due to the war damage to the main hospi £4000 to Charing Cross as a *first* instalment toward building on a site which has yet to be determined year £5000 had once more been set aside to encour establishment of *group preliminary training* sch nurses. Not long ago only 20 of the 85 training hosp the fund's area had schools; soon there would be a dozen without one. Referring to the fund's re hospital diet the Duke announced that several hospi already sought their advice and he was therefore ap a committee with Prof. J. C. Drummond, D SC., s *adviser to the* Ministry of Food, as chairman. Sir Jameson would also be a member and Miss Margaret had been appointed dietetic adviser.

Appointments

MILLS, HERMIA, MB LOND.: MO at Holloway Prison.

READ, J. C., MRCS, LDS: medical registrar at the Roya *Hospital, London.*

SOUTHWELL, NEVILLE, MB CAMB, MRCP: medical tutor an medical registrar at Guy's Hospital, London.

Births, Marriages and Deaths

BIRTHS

BICKFORD.—On Dec. 15, at Bolney, Sussex, the wife of Sq Leader B. J. Bickford, FRCS—a son.

JOHNSON.—On Dec. 15, in London, the wife of Lieut.-Colon Johnson, RAMC—a daughter.

MOLE.—On Dec. 6, at Crediton, the wife of Captain R. H. RAMC—a daughter.

NEILL.—On Dec. 7, at *Oxford, to Dr. Joyce Neill (formerly* Davies) wife of Mr. Desmond Neill—a daughter.

NICHOLL.—On Dec. 4, at Lewes, the wife of Surgeon Li Geoffrey Nicholl, RNVR—a son.

RAINEY.—On Dec. 15, at Harleston, Norfolk, the wife of Lieutenant R. E. Rainey, RNVR—twin daughters.

RATCLIFFE.—On Dec. 14, at Derby, the wife of Mr. J Ratcliffe, FRCS—a daughter.

STEVENS.—On Dec. 7, in London, the wife of Major C. P. RAMC—a daughter.

SYMONS.—On Dec. 13, at Moretonhampstead, the wife c H. M. SYMONS, RAMC, of Ballarat, Australia—a son.

MARRIAGES

HERFORD—CRAGO.—On *Dec.* 15, at Clifton, Bristol, Martin MBE, MC, MB, major RAMC, to Mary Crago, MB.

McBRYDE—DAVY.—On Dec. 18, at Hale, J. R. McBryde, *The Border Regiment, to Elisabeth Joan Davy,* lie RAMC.

OSTROWSKI—WIGHTMAN.—On Dec. 16, in Edinburgh, Maria Ostrowski, MB. CH B, 2nd lieutenant Polish Pa Unit, to Helen Mary Wightman.

PICKERING PICK—NETTELFIELD.—On Dec. 11, at Pyrford, Pickering Pick, MRCS, surgeon lieutenant RNVR, Nettelfield.

DEATHS

DUFFIELD.—On Dec. 17, at Bournemouth, Ernest Alphonse MRCS.

JOLY.—On Dec. 14, in London, John Swift Joly, MD DUBL aged 66.

TROUTON.—On Dec. 16, at Rotherfield, Sussex, Gardiner Trouton, TD, MD DUBL., aged 85.

WILLIAMS.—On Dec. 15, John Robert Williams, MB ED Penmaenmawr, aged 81.

WILLIAMS.—On Dec. 14, at Midhurst, Sussex, Reginald Williams, MD LOND., JP, aged 83.

WILSON.—On Dec. 12, Roger Parker Wilson, CIE, FRCS, DPH, colonel IMS. retd.

The fact that goods made of raw materials in short supply ow to war conditions are advertised in this paper should not be tak as an indication that they are necessarily available for expo

bursed by the Exchequer in paying maintenance allowances to tuberculosis patients are in my opinion adequate for the purpose in view.—Dr. SUMMERSKILL: Is not the Minister aware that the object of these allowances was to relieve the anxiety of the patients and to encourage them to undergo treatment, and that in view of the fact that the amount of the allowances in some areas is little different from the public-assistance rate, this purpose is not achieved ?—Mr. BROWN: The primary purpose is to make it easier for persons suffering from pulmonary tuberculosis to receive treatment without deterrent anxiety. I believe that there is a widespread welcome for this development.

Mr. F. MESSER: Is the Minister aware that in point of fact some of the categories in the memorandum are actually receiving less than the public-assistance scale ?—Mr. BROWN: The memorandum gives full information on the whole subject.

Dr. SUMMERSKILL asked the Minister why he was granting allowances to patients suffering from acute tuberculosis and withholding them from chronic and incurable cases.—Mr. BROWN replied: I would refer to the reply given on Oct. 28. Dr. SUMMERSKILL: Is the Minister aware that the treatment of the tuberculous in this respect is the most inhuman that can be devised, because the patient who is refused an allowance knows therefore that he is incurable ?—Mr. BROWN: I do not agree with that. The problem put to me was an industrial one. I asked the Medical Research Council to set up a committee, which they did, under Lord Dawson. I got their report, and allowances were settled for the first time and we got 100% grant from the Exchqeuer on a war basis. The larger problem falls to be considered with the whole question of dependants' allowances for sick persons.

Mr. H. MCNEIL asked the Secretary of State for Scotland how many applications from tuberculous patients for treatment or dependants' allowances had been refused since the inception of the scheme on the grounds that the applicants were not suffering from acute pulmonary tuberculosis or were unlikely to be fit for work within an ascertainable period.—Mr. T. JOHNSTON: Returns from all Scottish local authorities except two show that at Oct. 15, as compared with 1503 applications granted, 594 had been refused on the grounds stated in the question.

Miniature Radiography in Scotland

Miniature radiography sets have been allocated to the corporations of Glasgow and Edinburgh and to the county council of Lanark. The Glasgow set has been delivered and the corporation are now arranging for the appointment and training of the team which will operate it. Difficulties of supply are however delaying deliveries of the other sets. (Mr. Johnston replying to Mr. McNeil.)

Mass Radiography Apparatus for Russia

In reply to a question Mr. BROWN said: An offer recently made on behalf of the Government to present to the Soviet government two of the mass radiography units now being manufactured in this country has been accepted. They are to be sent to Russia almost immediately, and I learn from the Soviet Ambassador that one is to go to Stalingrad and the other to Leningrad. Though our present resources of these machines are limited, I feel certain that the people of this country will wholeheartedly approve the sending of two of them for the benefit of the heroic people of Leningrad and Stalingrad.

Staff Pay in Scottish Voluntary Hospitals

Mr. MCNEIL asked the Secretary of State for Scotland if all Scottish voluntary hospitals were paying their staffs the increased scales recommended by the Taylor Committee.—Mr. JOHNSTON replied: I am informed by the Scottish branch of the British Hospitals Association that 77 of the 120 voluntary hospitals in Scotland have decided to adopt the Taylor scales. Information with regard to the remaining 43 hospitals is not yet available.

Medical Treatment of Prisoners of War

Mr. R. W. SORENSEN asked the Secretary of State for War the number of prisoners of war, recently returned from Germany, who received surgical attention in Germany as the result of wounds received during the war; how many were fitted with artificial limbs by the German authorities; and whether he had received a Report respecting the general surgical and medical treatment our soldiers received.—Sir JAMES GRIGG replied: Very few of these men were fitted with [illegible]cial limbs by the German authorities. Most of them had [illegible]ably effective appliances improvised in camp workshops. In general there were few complaints from the prisoners about medical treatment, much of which was, however, carried out by British medical personnel.

Paper Supply for Scientific Books

Mr. HARVEY asked the Minister of Production whether, in view of the need for an increase in the supply of paper for books and especially for books of an educational and scientific character, he had now been able to make a larger allotment of paper for this purpose.—Mr. O. LYTTELTON replied: I have authorised an increase of 2½% of prewar consumption in the allocation to each publisher, and an addition to the reserve to meet special needs. As in the case of newspapers and periodicals, I shall expect the publishers to give special attention to the needs of the Services.

Health Conditions in Freetown

Major A. M. LYONS asked the Secretary of State for the Colonies whether he had had an opportunity of personally inquiring into the responsibility for the deplorable conditions of health, lack of fresh water, bad drainage and housing at Freetown; and whether he could give the House an assurance that he was satisfied that improvement had been effected and would be sustained until these serious shortcomings had been completely rectified.—Colonel O. STANLEY replied: The present unsatisfactory conditions at Freetown are primarily due to the enormous strain suddenly thrown upon the administration of Sierra Leone by the exigencies of war and the consequent great increase in its population. I am satisfied that the administration is doing its best to improve conditions as quickly as possible, but its efforts are very seriously hampered by acute shortage of skilled personnel and of essential materials, adequate supplies of which cannot be expected to be available for a long time to come.

Major LYONS: Can the Minister say whether the administration which allowed this shocking state of affairs has been strengthened in any way ?—Colonel STANLEY: I do not think that it is fair to blame the administration for whatever may have been the conditions at the beginning of the war. The then existing system had to work under the then income of the colony, and an administration which has had to work under those handicaps cannot be blamed for the result. Fortunately we have now altered that principle and in future the House will be able to help where a colony cannot do the requisite thing.

DOMESTIC SERVICE IN HOSPITALS

THE Government have adopted the recommendations of the Hetherington committee on the wages and working conditions of domestic staff in hospitals. "If hospitals and other institutions are to attract and retain domestic staffs of the quality which they require," say the committee, "every effort should be made to provide suitable conditions of accommodation and leisure." Some 10,000 more domestic workers are still needed in hospitals, and it is hoped that enough volunteers will now come forward to meet the shortage without recourse to the Minister of Labour's powers of direction.

For mental hospitals in England and Wales the committee adhere to the agreements made between the Mental Hospitals Association and the workers' union. For all other hospitals and institutions, voluntary or municipal, the minimum wage-scales for non-resident staff will range from 27*s.* 6*d.* a week for a maid of 15–16 years, to £3 5*s.* for cooks; for residents from £26 to £100 a year. Presumably a training in dietetics will carry a bonus. A 96-hour fortnight is recommended for all categories, with no extra pay for Sundays and bank holidays but time and a quarter for overtime. After 6 months service the domestic worker will be entitled to an annual week's holiday with pay, and in case of illness to 3 weeks' full and 3 weeks' half-pay in the first year, 6 weeks' full and 6 weeks' half-pay in the second year, and 9 weeks' full and 9 weeks' half-pay in subsequent years, NHI benefit being deducted from sick pay. Resident staff will be allowed an additional 12*s.* 6*d.* a week during holidays and sickness. The committee urge the need for efficient canteens for non-resident staff and suggest a scale of charges for meals. The wage-scales and conditions of service, which are fully set out in a white-paper (Cmd. 6481. HMSO. 2*d.*), must be complied with by all hospitals applying to the Ministry of Labour for domestic workers. Hospitals will welcome the Minister's promise, reported in our Parliamentary columns, to deal with recruitment to this work in exactly the same way as to any other form of important national service.

Letters to the Editor

OUTPATIENTS FIRST

SIR,—We are very glad to see in your leader of Oct. 30 reference to the need for improving the outpatient services at our large general hospitals. We warmly support your suggestion of a hostel and canteen for the use of the anxious relative, and for the outpatient who is undergoing X-ray or other treatment that does not necessitate the use of a fully nursed hospital bed. Considerable economy could, as you say, be effected. To the important reasons given in your leader pointing to the need for improvements, we would add the vital need in these days to avoid by every possible means the loss of working hours.

We regret, however, that separate outpatient blocks are postulated. Those who have studied this question carefully over a long period of years feel that quicker and more efficient investigation of the outpatient can be effected by close liaison with the medical, nursing and social welfare service available for the inpatient, than by completely divorcing the outpatient from the inpatient. We believe that the continuity in medical investigation, in nursing, and in social welfare which would be secured by a single service for the inpatient and the outpatient—who, after all, are generally the same

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the inpatient.

In the hospital which we have the privilege to serve, the latest of the large voluntary hospitals built in this country, the following arrangements were deliberately planned to give a quick, full and efficient investigation to outpatients.

The hospital is vertically planned, with good lift service. The outpatients and inpatients, according to their disability, are accommodated on one floor. For instance, on the third floor of the hospital building, both medical outpatients and inpatients are dealt with. The lift and staircase lobby is the only dividing line between the in- and the outpatient. The floor possesses for these medical cases, whether in- or outpatient, its own almoner and clerks, its own clinical laboratory, its own cardiographic unit, and so on. The sister of the medical ward attends the outpatient clinics of her own physicians. She sees the man as an outpatient and knows all about him when subsequently he arrives in her ward as an inpatient. A fuller medical service is assured, inasmuch as at almost any hour during the day there is a physician, registrar, or house-physician available on that floor to see any outpatient who may, through urgency, come to the outpatient department on a day not appointed for the clinic.

The same arrangements apply to surgical patients, and with the specialist departments the advantages are even greater, inasmuch as the special equipment, special operating theatres, special instruments, &c., can be used for both inpatient and outpatient. Furthermore, the nursing staff experienced in eye work, or in any specialist branch of medicine, is available for both inpatient and outpatient.

One of us, having had 37 years' experience of hospital administration, would assure you that no economy in expenditure or
inpatients from

would require only a
to deal with tests and
justified.

We have put the result of much thought and careful planning to the test of experience at Westminster. We invite those interested to study the system at work, even in the adverse conditions obtaining after 4 years of war and a blitz.

In conclusion, we would sound a note of warning. The existence of a highly organised, efficient outpatient service will by no means reduce the demand upon beds, as implied in your article. The better the outpatient department, the greater the demand for beds. That is our experience.

E. ROCK CARLING
Consulting Surgeon

Westminster Hospital,
S.W.1.

CHARLES M. POWER
House Governor and Secretary.

TONSILS AND ANTIBODIES

SIR,—Your leader shows a welcome spirit of tolerance for the pharyngeal lymphoid tissue. All tonsils except those of the newborn child contain living micro-organisms, picked up from food or air or both. Many of these organisms die, and to these the child is immune; others, to which he is not immune, live and produce toxins. From the tonsil these toxins pass to adjacent lymph nodes, and thence by efferent lymphatics to the tissues, evoking the formation of antibodies. The blood-stream carries the antibodies to the tonsil to destroy the organisms, the surplus antibodies remaining in the blood. The tonsil is therefore an inoculation organ through which immunity is built up and the child enabled to resist the infections current in the community in which he lives. Few children, if any, are born immune to all food or air-borne infections; most of them have to pass through many such infections before healthy adult life is reached. An attack recovered from may therefore be regarded as a stepping-stone towards increased immunity. The same duties are shared by the adenoid mass and the lymphoid follicles scattered about the mucous membranes of the body, including the Peyer's patches (which of course deal mainly with food-borne infections).

The crypts of the tonsil, however, form ideal breeding places for organisms, and though no such crypts are present in the adenoid mass it contains spaces between its folia in which organisms can lodge and multiply. Because of their size and structure the tonsils and adenoids are a more important section of what you have called the antibody factory than the smaller lymphoid follicles scattered about the mucous membranes. During childhood, then, they have important work to do which is interrupted by their removal; and unless they are harbouring an organism to which no further immunity is possible they should be left where they are.

Reasons usually given for removal of tonsils are: recurrent sore throats; and tonsillar sepsis or enlargement. If sore throats are an essential phase in the acquirement of immunity, removal for this reason cannot be justified. There are different degrees and forms of sepsis, but it is impossible to assess these by inspection. In the sense that they all carry micro-organisms all tonsils are septic; but the mere presence of organisms does not tell us that the production of antibodies has ceased. Large tonsils have been accused of hindering breathing and swallowing, but these are imaginary dangers. It is quite common to see a perfectly healthy child with very large tonsils, and mere bulk does not imply failure in performance.

Three main reasons given for the removal of adenoids are: mouth breathing; recurrent colds; and discharging ears. The adenoid mass, like the tonsils, enlarges when it is inflamed, and in that state might block the airway; but the
the adenoid mass must rarely
breathing at other times.
for nasal obstruction it is not uncommon to find the adenoid mass quite small; such children, however, usually have a mucous or mucopurulent nasal discharge coming not from the adenoids but from the sinuses. In most of these cases transillumination shows an opaque sinus on one side or both. Sinusitis is accompanied by enlarged turbinals and these usually cause more obstruction when the child is lying down than when he is standing, so that the noise of obstructed breathing is more troublesome at night than in the daytime. Nasal obstruction in children, then, is often due to recurrent enlargement of the turbinals which may in turn be due to an infected ethmoid labyrinth. Small doses of potassium iodide (grains ½–3, depending on the age of the child) stimulate the mucous glands of the nose and drain the sinuses by increasing secretion. Like recurrent sore throats, recurrent colds have their place in the process by which immunity is acquired; so that they do not indicate adenectomy. Removal

of adenoids, is sometimes successful in reducing or stopping aural discharge in subacute or recurrent cases, many of which would have recovered in any case. In chronic cases it usually fails. Primary acute otitis, on the other hand, often follows removal of adenoids.

The main function of the tonsil and adenoid mass, then, is to pick up organisms from food or air or both, and to grow those to which an immunity is required. Until it is evident clinically that they contain an organism to which immunity is impossible, it would appear unwise to remove them.

Liverpool. P. W. LEATHART.

COUNTING LEUCOCYTES

SIR,—In view of the limited supply of standard pipettes for counting leucocytes, I have been encouraged to publish an alternative method, based on that of Strong for counting red cells, which has been found satisfactory.

3-inch Wassermann or Kahn tubes are fitted with corks (preferably rubber bungs), the latter being numbered in indelible pencil on the upper surface. From a clean 1 c.cm. graduated pipette 0·38 c.cm. of dilute (2%) acetic acid, suitably coloured, is accurately measured into each tube which is then stored upright. Blood is taken into a 20 c.mm. hæmoglobin pipette, blown into the acid and the pipette washed out. The cork is replaced and the tube, held in the right hand, is briefly shaken, with a circular movement, against the fingers of the left hand so that fluid does not reach the cork. The number of the tube is noted on the request form.

For the count, after similar but more thorough shaking, a sample of the dilution is transferred by means of a capillary (or hæmoglobin) pipette to a Neubauer counting chamber. The dilution is 1 in 20 and, if the cells in the four corner squares, each 1 sq. mm., are counted, the total is multiplied by 50.

If distilled water and acetone are carried, the pipette is readily cleaned and dried, and will serve for a round of blood-counts. It is much easier to get an even suspension in the tubes than in the bulb of the standard pipette, and safe transport of the specimens is simplified.

Claybury Emergency Hospital,
Woodford Green. F. C. O. VALENTINE.

CONDITIONS OF MEDICAL SERVICE

SIR,—It was with great interest and still greater pleasure that I read in your issue of Oct. 30 the letter signed by 238 members of the British Medical Association. Not long ago, I, like others of the younger members, felt so disgusted at the policy of the BMA that I resigned membership. Working, as I was at that time, in a rather remote area, I was unable to attend the meetings of the local branch, as to do so would have meant nearly a day's absence from my practice. Only senior and well-established practitioners can afford to take risks of this kind, and unfortunately these same persons are not only very often reactionary in their outlook, but they have also quite definitely a vested interest at stake. These, on the whole, are the people who attend BMA meetings and their viewpoint is reflected in the decisions of the Annual Representative Meeting. The more enlightened minority has always been more or less inarticulate, and it is encouraging to see it coming to life at last. It is, I hope, after all the "little leaven" that "will leaven the whole lump." It has always seemed to me remarkable how little concerned a certain section of the profession appear to be with the welfare of the community, and how greatly concerned over the welfare of the doctor.

With the present shortage of doctors, which cannot be remedied all at once but which will persist for many years yet, surely the only way of meeting fairly the ever-increasing demand with a strictly limited supply is by organising a salaried medical service for the whole country. Before the war doctors, sad to say, often congregated where there was money and not where there was need.

The same issue of THE LANCET contains another letter in very different vein—that of Dr. Thomas Nelson. I must take exception to the suggestion that present National Health Insurance capitation fee s out at sixpence per visit or consultation—I think is what is inferred in the jibe about "state dope." On this assumption the practitioner earning £1100 a year from his panel would be seeing on the average 120 insured patients every day!

The chief objection to the panel system, or indeed to any competitive system, is that the more patients one has the less attention one can give them. Payment at "piece-work" rates does not necessarily improve matters as it may encourage either hurried imperfect work, or else unnecessary work. I have known a small local friendly society discontinue payment to doctors on a piece-work basis and substitute a capitation fee, simply because they discovered that a great many quite unnecessary visits were being paid. The medical profession, unfortunately, is no more honest than the rest of mankind.

Finally, does not a full-time salaried state medical service get rid once and for all of that dreadful anachronism whereby the young doctor must needs buy a practice before he can, with any hope of security, give his services to the community? Most of us have to borrow, and have consequently a millstone round our own (and our wives') necks for many years. Those lucky ones, who have been fortunately born, start in practice with no such handicap. Academic qualifications and practical experience should be all that are required in order that a man may serve the community to the full. It is high time a stop was put to the sentimental and mischievous nonsense talked about the alleged virtues of competition and the ennobling effects of struggle and self-denial.

Aberdeen. JOHN H. WILSON.

SIR,—The first happy days of a doctor's life are those spent at hospital as a senior student or as a resident. They are happy because his mental powers are devoted, without inhibition or ulterior motive, to the arts of clinical examination and the diagnosis and treatment of disease. Competition may be keen, not only between student and student but also between student and teaching staff; criticism is freely exchanged over successes and failures; but competition and criticism are always friendly.

Many members of my profession spent happy days in active service on land or at sea in the last Great War. They had little time to consider the pros and cons of a professional Service career; their only anxiety was to serve. Neither the Army nor the Navy is devoid of regulations, but it is certainly the rarest occurrence for either the enjoyment or the efficiency of a doctor's work in these Services to be hindered because he is a "slave of the state."

In general practice the doctor's environment is profoundly different. There is little or no friendly discussion with his colleagues in regard to his own patients; indeed he is too often justified in his fear lest one of his patients should be seen by a colleague. The failures of each doctor are pounced upon by another, his successes pass with praises unsung and are cynically attributed to a divine providence protecting the patient.

Diagnosis is often influenced by the patient's desire, which has to be considered, while the doctor's bread-and-butter depends on pleasing that patient. Not infrequently the diagnosis is determinedly made by the patient with the emphatic statement "I don't feel like work, I think I want a week's rest," after which statement clinical examination assumes a secondary importance and treatment is often not expected. Should clinical examination reveal no evidence of disease, the week's sickness would be granted rather than lose the patient or (what is more important) the bread-and-butter that he represents. It is difficult for the doctor to adopt a higher code of behaviour, for it is considered very proper to give the patient the benefit of the doubt.

Efficient examination is hindered at every turn by the expense of radiological or pathological investigations, often too expensive for the patient to bear, while the personal inconvenience and loss of time in obtaining such investigations at a voluntary hospital, under their present organisation, deters the patient from such a course. This is a criticism of the organisation of such hospitals, not of my colleagues who devote so much of their valuable time to their service.

Treatment sometimes has to be given when it is totally unnecessary, because the power of money gives the private patient the right to demand such treatment, while the power of a state contract (which is completely one-sided) gives every insured patient an equal right. On the other hand, some treatments sadly necessary, such as physiotherapy for the most prevalent of all diseases in this [illegible] —or [illegible] onal [illegible] because the patient cannot afford unavoidably expensive private treatment or because he cannot get it at a hospital without all the vexations of passing through the preliminaries of the general outpatient department.

Some of us, though engaged in general medical practice, have had a good many years' experience of part-time service in the municipal hospital services, in which capacity, if no "slave of the state," one is at least the servant of a municipality. Here again a doctor can live and work in the atmosphere of work for work's sake. He is brought into intimate contact with the whole-time salaried medical officers of such hospital, the association being as delightful as the associations of student days. Indeed the atmosphere is in all respects similar, with a complete absence of money values, a complete absence of jealousy, inhibitions, and ulterior motives.

It is of course true that in these vast municipal services "free choice of doctor" is as meaningless as it is for the 18 million or more of the population who rely so largely upon the voluntary hospitals for the diagnosis and treatment of most diseases other than mild ailments. In neither case does the patient, recommended to a hospital, ever make his attendance depend upon this choice of a particular member of the hospital's staff.

At its worst, could a whole-time state medical service be anything but a vast improvement on private medical practice at its best? I do not seek publicity and therefore must sign myself

A GENERAL PRACTITIONER.

DIPHTHERIA IN IMMUNISED CHILDREN

SIR,—In your issue of Oct. 16 (p. 400) you refer to the high incidence of diphtheria in immunised children in Dublin; and you state, apparently by way of explanation, ". . . but it should [illegible] boards."

[illegible] time ago I made a detailed study of diphtheria statistics in Dublin, the results of which were in part published (*Irish J. med. Sci.* April–May, 1943). During the years 1935, 1936 and 1937 children received one injection of APT. Before that time they received three injections of TAF or TAM, and since then two injections of APT, each of 0·5 c.cm. Up to the end of 1942, 35·1% of the children immunised had received only one injection of prophylactic. The extent to which children immunised in 1934, when they received three injections of TAF, subsequently contracted diphtheria may be compared with the extent to which those immunised in 1935 and 1936 with one injection of APT contracted the disease. Of 9383 children immunised in 1934 with TAF, 78 had contracted the disease up to the end of 1942, giving an attack-rate of 8·4 per thousand. Of 30,180 receiving one injection of APT in 1935, 219 had contracted the disease up to the end of 1942, and of 11,103 receiving one injection of APT in 1936, 109 had contracted diphtheria by the end of 1942, giving attack-rates of 7·3 and 9·8 per thousand respectively. These figures do not suggest any difference between the protective effect of one injection of APT and that of three injections of TAF.

I have shown in my paper that there may be no difference between the protective effect of two injections of APT and that of one injection. This has been shown by comparing the attack-rates in those immunised by the two methods for the year of inoculation and two subsequent years, allowing a period of three months after immunisation to elapse before counting the cases, taking into consideration also the age-distribution of the immunised and fluctuations in the virulence of the disease. Thus the fact that so many received only one [illegible] does not in itself explain the [illegible]ia in immunised children. Not[illegible] the high proportion of children (75% of the child population at the end of 1941) who have received immunising injections, the returns for the present year show a higher incidence of diphtheria in Dublin than ever before. While evidence in favour of any influence of the present prophylactics on the incidence of diphtheria in Dublin is open to question, it does appear that the risk of a fatal issue is less in those who have been inoculated than in those who have not.

School of Pathology, Trinity College,
Dublin.
J. C. GAFFNEY.

STERILITY AND IMPAIRED FERTILITY

SIR,—The statement under this heading in your issue of Oct. 9 (p. 457) directs attention to the frequency of (physiological) sterility and to the need for an extension of facilities for its further investigation and treatment. With this part of the letter of your sixteen correspondents we are in agreement.

We do not, however, agree that "consideration of all available data strongly suggests that the barren and the very small family reflect lower fecundity rather than excessive unwillingness to reproduce." We believe that a definite pronouncement on these questions cannot be made until much more evidence becomes available. For example, we require to know the fertility trends in the major social groupings and the variation in the size of families according to social and economic levels, by date of and age at marriage. These are data which can only be ascertained by [illegible] meanwhile, [illegible] the creation of [illegible] changed social and economic standards. Thus, so long as there is no adequate evidence of a differen[illegible] fertility [illegible] assume, [illegible] professional [illegible] restriction.

From the demographic standpoint, the central question at the present time is whether infecundity has *increased* in such a way as to play a part in the decline in fertility. At present there is no evidence to show that such an increase has played any part at all. There is no reason for thinking that fertility is any more affected by this cause now than it was 70 years ago, when the birth-rate was over 30 per thousand. In the effort to raise fertility, undoubtedly everything should be done to help parents who are involuntarily sterile; but the main object of policy must remain that of changing the social and economic conditions and the attitudes of normally fecund parents so as to favour the large rather than the small family.

A. M. CARR-SAUNDERS. R. M. TITMUSS.
D. V. GLASS. JAMES YOUNG.
EARDLEY HOLLAND. C. P. BLACKER.
HORDER,

Population Investigation Committee,
69, Eccleston Square, London, S.W.1.

A CHIEF'S FORESIGHT

SIR,—Your peripatetic correspondent is not quite correct in his reference to the Kikuyu: the Kikuyu are essentially agricultural. It was the Masai who sold their precious cattle to Liebig's to get the money to pay for M & B 693 to cure their gonorrhœa. The credit for this transaction is undoubtedly due to the patience and persuasive powers of the medical officer who taught the chiefs that the sterility of their women was largely caused by Neisser's organism and could be cured by drugs.

Devoran, Cornwall. JAMES H. SEQUEIRA.

MEDICAL MAN-POWER.—The Minister of Health in circular 2881 has passed on to hospital authorities the recommendation of the Medical Personnel (Priority) Committee that for the present the war-time establishment of hospitals shall not be increased and that no posts shall be upgraded. The post of medical superintendent is not covered by the recommendation but in considering applications from local authorities for permission to create these posts the Minister will feel bound to have regard for the committee's suggestion.

Last May the Minister informed public-health medical officers of military age that they must obtain his permission before applying for a new post. This procedure has now been extended to women medical officers holding whole-time public-health appointments who are over military [illegible] who were born after March 5, 1896.

Sussex landscape and an impression of Chiswick Reach painted with a subtle mistiness almost reminiscent of the physician's art. Dr. Hinds Howell contributed a strong, delightful woodland landscape. Among the other water-colours one by a student was outstanding; an oak tree by an English lane in the soft light of an October morning was the subject, and the impression was satisfying. This escapism—this deliberate turning to lighter thoughts and lighter subjects—was the keynote of the show, with the dismal exceptions provided by the secretary, who introduced a skyline of shattered masonry with morbid persistence. Expressive figures in plaster, wood and ivory by Miss Beth Jukes, were the work of a capable artist, and Mr. Brian Brooke had chiselled two heads in stone during his spare time from surgery.

There was creditable evidence of fresh ideas struggling for expression, and though the successful paintings stood out like good deeds in a slightly imperfect world the indications were that medicine and culture still go hand in hand.

University of Cambridge

On Oct. 30 the degrees of MB, B CHIR were conferred by proxy on J. W. Fawcett.

Royal College of Surgeons of England

The annual meeting of fellows and members will be held at the College, Lincoln's Inn Fields, London, W.C.2, on Thursday, Nov. 18, at 2.30 PM.

Royal College of Physicians of Ireland

At a meeting of the college on Oct. 18, Dr. W. G. Harvey was elected president. Dr. Harvey was, till he retired last year, one of the physicians to the Adelaide Hospital, Dublin. He has been a fellow of the college since 1908.

Royal College of Physicians of Edinburgh

At a meeting of the college held on Nov. 2, with Dr. Charles McNeil, the president, in the chair, Dr. Ian Murray (Glasgow) and Dr. Harry Stalker (Edinburgh) were introduced and took their seats as fellows. The Hill Pattison-Struthers bursaries in anatomy and physiology, and clinical medicine were awarded to W. R. Brown and P. D. Kemp respectively.

Royal Society

The Copley medal has been awarded to Sir Joseph Barcroft, FRS, for his work on respiration and the respiratory function of the blood, and the Davy medal to Prof. I. M. Heilbron, D SC, FRS, for his contributions to organic chemistry, especially to the chemistry of natural products of physiological importance.

Royal Society of Medicine

At a joint meeting of the sections of physical medicine and disease in children on Wednesday, Nov. 17, at 4 PM there will be a discussion on anterior poliomyelitis. The opening speakers are to be Major William Stewart, USAMC, Dr. Queenie May and Mr. Eric Lloyd. On Nov. 18, at 2.30 PM, Brigadier Hugh Cairns will deliver his presidential address to the section of neurology. He will speak on gunshot wounds in the head and afterwards there will be a discussion. Cases will be shown at the meeting of the section of dermatology at 4 PM on the same day. On Nov. 19, at 4 PM, Dr. Albert Sharman will read a paper to the section of obstetrics and gynæcology on some recent studies and investigations in sterility. On the same day at 4.45 PM the section of radiology will meet to discuss the organisation of a fluoroscopic service for the civilian community. The openers are to be Dr. Maurice Davidson, Major Peter Kerley, Dr. P. D'Arcy Hart and Wing-Commander R. R. Trail.

Campaign against Colds

For the third winter in succession the Ministry of Health, in cooperation with the Ministry of Information, is launching a campaign to reduce the spread of colds, influenza and other droplet infections. The public will again be urged to "help to keep the nation fighting fit" by avoiding careless coughing and sneezing. Posters, vehicle bills, window displays and films will be used. As before, copies in 35 mm. sound and 16 mm. sound of "Breath of Danger" (9 minutes), and of "The Nose Has It" (5 minutes) may be borrowed from the Central Film Library, Imperial Institute, Kensington, London, S.W.7. "Breath of Danger" may also be borrowed from the Central Council for Health Education, Tavistock House, Tavistock Square, W.C.1, which made it. The council offers health leaflets and posters for sale to local ities.

Eugenics Society

On Tuesday, Nov. 16, at 5 PM, at the rooms of the Royal Society, Burlington House, Piccadilly, W.1, Mr. R. M. Titmuss will speak on social environment and eugenics.

Paddington Medical Society

On Tuesday, Nov. 16, at 8.45 PM, at St. Mary's Hospital, Paddington, W.2, Mr. A. Dickson Wright will lecture on recent advances in surgery.

Royal Society of Tropical Medicine and Hygiene

A meeting will be held at 26, Portland Place, London, W.1, on Thursday, Nov. 18, at 3 PM, when Lieut.-Colonel Ernest Bulmer will read a paper on tropical diseases in soldiers in the Middle East.

Thoracic Surgery at Preston Hall Sanatorium

Major thoracic surgery has been discontinued at Preston Hall, Maidstone, since Laurence O'Shaughnessy was killed in France in 1940. It is now hoped to use Preston Hall as a centre for the surgical treatment of patients from all three institutions now under the British Legion, the others being Nayland Sanatorium near Colchester, and Douglas House, Bournemouth. Surgeon Commander G. A. Mason has been appointed thoracic surgeon to the British Legion Village from Nov. 1.

Faculty of Radiologists

The diagnosis section will meet at 32, Welbeck Street, London, W.1, on Saturday, Nov. 20, at 10.30 AM, when Captain P. P. Hauch, RCAMC, will speak on pneumoroentgenography of the knee-joint, Dr. E. Rohan Williams on venous intravasation during utero-salpingography, and Dr. John Wilkie on a case of Albright's disease.

Bernhard Baron Grants

The Charities Fund have made a grant of £30,000 to Queen Charlotte's Hospital to provide more accommodation for maternity cases. The grant is conditional on a section of the partly built nurses' home being completed by the end of next year. The fund has also granted £10,000 to the British Empire Cancer Campaign and £5000 to the Robert Jones and Agnes Hunt Orthopædic Hospital.

London Association of Medical Women's Federation

At a meeting to be held at BMA House, Tavistock Square, London, W.C.1, on Saturday, Nov. 20, at 3 PM, Dr. Ian Skottowe will discuss some current methods of treatment in psychological medicine.

Medical Casualties

The following casualties among RAMC officers have been announced:

Wounded.—Captain E. M. Leyland, MB EDIN., Captain F. M. Steel, MB GLASG., and Captain J. R. Tocher, MB ABERD.

Prisoner of War.—Major K. C. Hutchin, MB GLASG.

THE makers of Insulin A.B. and Insulin 'Wellcome' brand announce that, following the adoption of improved production methods, the prices of these products will be reduced on Jan. 1, 1944, to correspond with those now in force for H-A-B Insulin and Insulin Hospital Packing (BWCo). In consequence the issue of hospital packings will cease on that date and the makers will supply Insulin A.B. or Insulin 'Wellcome' brand whenever insulin is ordered.

THE epidemic of poliomyelitis in Malta described by Prof. H. J. Seddon (*Lancet*, Oct. 30, p. 549) occurred between November, 1942, and March, 1943.

Appointments

CLYNE, D. G. Wilson, BM OXFD, MRCOG: temp. gynæcologist to the Hampstead General and North-West London Hospital.

NEWELL, A. G., MD GLASG., DPH: temp. MOH, school MO for Blyth and MO to the River Blyth port health authority.

NORRIS, D. C., MD LOND., FRCS: part-time surgical registrar to the outpatient department at the Royal National Orthopædic Hospital, London.

PARRY-EDWARDS, O. J., MB DUBL.: asst MOH and school MO for Anglesey and medical superintendent of Valley Emergency Hospital.

SAMES, C. P., MB LOND., FRCS: part-time surgical registrar to the outpatient department at the Royal National Orthopædic Hospital, London.

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PATULIN IN THE COMMON COLD

COLLABORATIVE RESEARCH ON A DERIVATIVE OF *PENICILLIUM PATULUM* BAINIER

I. Introduction

HAROLD RAISTRICK, SC D CAMB, F R S
PROFESSOR OF BIOCHEMISTRY IN THE UNIVERSITY OF LONDON, AT THE LONDON SCHOOL OF HYGIENE AND TROPICAL MEDICINE

WORKERS in this laboratory have been engaged for some years in a systematic study of the metabolic products of the lower fungi (moulds). A large number of these substances has been isolated in a state of purity and in many instances their chemical structure has been determined and some of them have been synthesised. In the last two or three years the antibacterial activity in vitro of some of these mould metabolic products has been investigated (Raistrick and Smith 1941, Oxford, Raistrick and Smith 1942, Oxford 1942 (a) and (b), Oxford and Raistrick 1942, Birkinshaw, Raistrick and Smith 1942). Some time ago a metabolic product of *Penicillium patulum* Bainier which had not been previously encountere[illegible] to have antibacterial [illegible] identified as *anhydro*-[illegible]-*γ*-*pyrone*-*2-carboxylic acid*, and has been given the shorter name of "patulin."

Soon after its isolation the new antibacterial substance was sent to Dr. W. E. Gye for another purpose. It happened however that at the time he had a severe common cold, and knowing that the antibacterial substance was equally effective against gram-positive and gram-negati[illegible] on himself. The outcome w[illegible] for him to repeat the test [illegible]aff, and the results obtained [illegible] he trials in a series of controll[illegible] fortunate in enlisting the hel[illegible] Sir Sheldon Dudley, Medical Director-General of the Navy, and through his good services a fully controlled trial was carried out by Surgeon Commander W. A. Hopkins at a Naval establishment. The results obtained by Commander Hopkins have been examined statistically by Prof. Major Greenwood. In the meantime work was in active progress in this laboratory to determine the optimum conditions for the formation of the new antibacterial substance, and also to settle its chemical structure.

The results of this collaborative research are given in detail below and it will be seen that the clinical possibilities of patulin are promising. Since, however, it is desirable firmly to establish the value of the preparation and its complete freedom from danger when used as [illegible] general [illegible]ale con[illegible]de with [illegible] Britain [illegible] the pure

II. Biochemistry and Chemistry

J. H. BIRKINSHAW
D SC LEEDS, F I C

S. E. MICHAEL
PH D FREIBURG, A I C

ARTHUR BRACKEN
B SC LOND

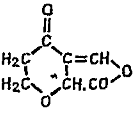
HAROLD RAISTRICK
SC D, CAMB, F R S

(*London School of Hygiene and Tropical Medicine*)

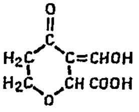
Filtrates [illegible] Bainier gr[illegible] inhibit the [illegible] to 1 : 160. [illegible] isolated in [illegible], with one strain of *P. patulum*, of more than one gramme per litre of culture filtrate. The pure antibacterial substance completely inhibits the growth of *Staph. aureus* at a concentration of 1 : 64,000 and is believed to be anhydro-3-hydroxymethylene-tetrahydro-*γ*-pyrone-2-carboxylic acid of structure 1.

The experimental evidence on which this suggested structural formula is based is as follows. Patulin is a colourless, beautifully crystalline substance with a melting point of 111° C. and the empirical formula, $C_7H_6O_4$. It has one active hydrogen atom in the molecule in pyridine solution, no carbon methyl group and is optically inactive. It forms a mono-2 : 4-dinitrophenylhydrazone and a phenylhydrazone and thus contains the -CO- grouping. It also forms a mono-acetyl derivative. We believe that the keto-enol grouping, $\text{-}CH_2.CO\text{-} \rightleftarrows \text{-}CH = C(OH)\text{-}$ is the grouping which furnishes the active H atom, gives the mono-2 : 4-dinitrophenylhydrazone and phenylhydrazone (as the keto form) and the acetyl [illegible]

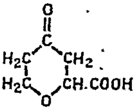
An aqueous solution [illegible] does not titrate as an [illegible] contain a free -COOH group. However, on treatment with an excess of cold N/10 aqueous sodium hydroxide for 2–3 hours nearly 2 equivalents of acid are unmasked. The solution, at first colourless, becomes bright yellow and now gives a strong red colour with ferric chloride whereas the parent substance gives no colour with this reagent. We suggest that these facts can be readily explained by assigning structure 2 to the, at present, unisolated hydrolysis product which would thus be 3-hydroxymethylene-tetrahydro-*γ*-pyrone-2-carboxylic acid.



Structure 1



Structure 2



Structure 3

The position of the carbonyl, =CO, group as *γ* to the potential carboxyl group in structure 1 was established as follows. On heating patulin with concentrated hydriodic acid there is formed, in good yield, a crystalline iodo-acid, $C_6H_9O_3I$, which was shown to be *γ*-keto-*ε*-iodo-*n*-hexanoic acid, $CH_2I.CH_2.CO.CH_2.CH_2.COOH$, which, on reduction with zinc and HCl, gave *γ*-keto-*n*-hexanoic acid, $CH_3.CH_2.CO.CH_2.CH_2.COOH$.

[illegible] above iodo-acid contains one [illegible] concentrated HI and red phosphorus, gave the lactone of *β*-methyl-*γ*-hydroxy-*n*-hexanoic acid, $CH_3.CH_2.CHOH.CHCH_3.CH_2.COOH$ and *β*-methyl-caproic acid, $CH_3.CH_2.CH_2.CHCH_3.CH_2.COOH$.

Finally, when patulin is hydrolysed by boiling with 2N. H_2SO_4, there is formed almost 1 molecule of formic acid, and in smaller yield a monobasic acid, $C_6H_8O_4$, according to the equation

$$C_7H_6O_4 + 2H_2O \longrightarrow H.COOH + C_6H_8O_4$$

The acid, $C_6H_8O_4$, has been conclusively shown to be optically inactive tetrahydro-*γ*-pyrone-2-carboxylic acid [illegible] precursor of formic acid and tetrahydro-*γ*-pyrone-2-carboxylic acid of structure 3 must have structure 2. The abstraction of water from structure 2 to give a structural formula depicting the known properties of patulin leads to structure 1 or one of the tautomeric forms.

Experimental

History and description of cultures.—Two cultures identified as strains of *P. patulum* Bainier were used throughout this work. They bear the LSHTM catalogue numbers P 180 and Ad 77. We are indebted to our colleague, Mr. George Smith, for the following description of these two strains:

Strain P 189 was obtained from the Centraalbureau voor Schimmelcultures, Baarn, Holland, [illegible] *P. Lagerheimi* [illegible] of Westling's [illegible] ing's [illegible] is not his species. Thom places *P. lagerheimi* [illegible] cillata-symmetrica, while the CBS culture is a[illegible] asymmetrica-fasciculata, and is very appearance to *P. urticæ* Bainier, a well-defined and easily recognised species of which there are two strains in the LSHTM collection. It differs however from *P. urticæ* in its more restricted growth, in lack of odour and in its less complex type of penicillus, and fits very well with Thom's description of *P. patulum* Bainier (Thom 1930). The CBS seem to have some doubt as to the correctness of their identification of this strain, since, after being listed in 1934 and 1935, it did not appear in the 1936 and subsequent catalogues. Unfortunately it is impossible, under present conditions, to ask the CBS their reason for the withdrawal.

Strain Ad 77 was isolated in 1926 by J. H. V. Charles from condenser water. It was one of the species used by Birkinshaw and others (1931) in an investigation of glucose metabolism by species of Penicillium, but was not definitely identified. In culture on liquid media, as used in this investigation, it is indistinguishable from P 189. On agar media the two are indistinguishable in the early stages of growth, but after about two weeks Ad 77 begins to show somewhat more marked fasciculation and more definite zonation than P 189. The differences, however, are no more pronounced than would be normally expected in different strains of the same species.

CULTURAL CONDITIONS

Patulin is produced by both mould strains, P 189 and Ad 77, on a variety of synthetic liquid culture media, but we have found that a Raulin-Thom medium of the following composition gives the most consistently reliable results:

Glucose, 75 g.; tartaric acid, 4 g.; diammonium tartrate, 4 g.; $(NH_4)_2HPO_4$, 0·6 g.; K_2CO_3, 0·6 g.; $MgCO_3$, 0·4 g.; $(NH_4)_2SO_4$, 0·25 g.; $ZnSO_4$, $7H_2O$, 0·07 g.; $FeSO_4$, $7H_2O$, 0·07 g.; distilled water, 1500 ml.

This medium was distributed in 350 ml. amounts in each of a number of one litre conical flasks plugged with cotton-wool. The flasks were sterilised by autoclaving and each flask was then sown with a spore suspension in sterile distilled water of P 189 or Ad 77 prepared from cultures grown for about two weeks on beer-wort agar. The flasks were then incubated in the dark at 24° C. for 12–14 days. We are indebted to Mr. Smith for the preparation of the cultures and the inoculation of the flasks.

Growth of both strains of fungus on the above medium was vigorous. In the early stages the upper surface was white, changing towards the end of the incubation period to light green. The reverse of the mycelium was a characteristic brick red. The metabolism solution gradually changed colour from an initial very pale yellow to brownish-yellow.

The course of the formation of patulin was followed by frequent assays during the incubation period of the antibacterial potency of the metabolism solution against *Staph. aureus* LSHTM strain. The serial dilution method of assay was used (Oxford, Raistrick and Smith 1942), and we are indebted to Mr. Smith and Mrs. J. M. Webb for the results obtained. When the antibacterial activity had reached a maximum, usually on the 13th or 14th day of incubation, the flasks were harvested. Details of typical experiments are given in the table.

ISOLATION AND PURIFICATION

At the end of the incubation period the metabolism solution was separated by filtration from the mould mycelium and the clear filtrate was evaporated, without further treatment, in vacuo, at a bath temperature of 40–45° C. to about a twentieth of its volume. Patulin may be separated from the concentrate by either of the following methods, depending on the apparatus available:

(*a*) If a satisfactory continuous extraction apparatus is available the concentrate is extracted with ether in such an apparatus.

(*b*) If such an apparatus is not available the concentrate is extracted three times with an equal volume each time of ethyl acetate. The combined ethyl acetate extracts are washed with a little water, dried over anhydrous Na_2SO_4, and evaporated *in vacuo to remove as much of the ethyl acetate as* possible. The residual oil, which may partially crystallise, is then extracted with ether and the small amount of dark [illegible] material is removed by filtration.

The ethereal solution, whether obtained by method (*a*) or (*b*), was diluted with ether and passed through a column of Al_2O_3 (BDH for adsorption) which had been previously washed with dilute HCl and dried at 100° C. The column was then washed with an equal volume of ether and the combined filtrate and washings were evaporated to small bulk. The ether concentrate was held at 0° C. for 24 hours and patulin separated in large colourless tablets which are almost analytically pure. These were separated by filtration, washed with ether and dried. Further concentration of the mother liquors gave a second crop of somewhat less pure patulin.

The final ethereal mother liquors contained a number of other metabolic products, some of which have been obtained in a state of purity though none of them shows any antibacterial properties. A description of these products is reserved for a later communication.

DETAILS OF SOME TYPICAL EXPERIMENTS

Strain of *P. patulum*	Incubation period (days)	Residual glucose by polarimeter (%)	pH	Inhibition against *Staph. aureus*		Method of extraction	Yield of pure patulin g. per litre of metabolism solution
				Complete	Partial		
P 189	14	1·45	3·2	1:80	1:160	(*a*)	0·70
P 189	12	1·50	3·2	1:80	1:160	(*b*)	0·75
Ad 77	14	0·74	5·0	1:160	1:320	(*b*)	1·26
Ad 77	14	0·86	3·9	1:160	1:640	(*a*)	1·09

Typical experiment with P. patulum, *strain Ad 77.—No.* of flasks, 52; incubation period, 14 days; residual glucose, 0·61%; pH, 4·9. Inhibition of *Staph. aureus*—1:160 complete; 1:320 partial. Volume of metabolism solution treated, 16·2 l.; final volume after evaporation in vacuo, about 1 l. Method of extraction (*b*); 65 g. of residual oil dissolved in 1·5 l. of ether, passed through a column of Al_2O_3 (200 g., length 20 in., diameter 1 in.) and washed with 1·5 l. of ether; evaporated to 250 ml. First crop of patulin: wt. 19·6 g., MP 110° C.; colourless tablets. Second crop of patulin (ex 80 ml. of mother liquor): wt. 1·6 g., MP 110° C.

The material obtained as a first crop from the ether concentrate is already sufficiently pure for most purposes. If desired, it may be obtained in a state of complete purity and constant MP (111° C.) by recrystallisation from ether, benzene or chloroform.

GENERAL PROPERTIES

Patulin crystallises from ether in colourless, compact prisms or thick plates, often of a considerable size. MP, 111° C. (with some decomposition). Found: C, 54·64, 54·56; H, 4·15, 4·13%; N, nil; OCH_3, nil; mol. wt., cryoscopic in dioxane (Dr. A. E. Oxford) 171 ± 10%. $C_7H_6O_4$ requires C, 54·55; H, 3·93%; mol. wt., 154.

In a Zerewitinoff estimation carried out in pyridine at 23° C. the substance gave methane corresponding to 1·03 active hydrogen atoms per molecule and in anisole at 22° C. 0·42 active hydrogen atoms. A C-methyl group estimation carried out by the Kuhn-Roth method gave 0·75% CH_3; theoretical for 1 C-methyl group, 9·74%. Patulin therefore contains no C-methyl group.

Patulin is optically inactive. It is soluble in water and in most of the commoner organic solvents except light petroleum. When a 1% aqueous solution is shaken with an equal volume of ether at room temperature about 35% of the substance is dissolved by the ether. Under comparable conditions ethyl acetate extracts 75% and amyl acetate 62%. An aqueous solution of patulin is neutral to litmus and does not titrate as an acid. The substance gives no reaction with aqueous ferric chloride or with Schiff's reagent for aldehydes. It reduces Fehling's solution *strongly* on heating and immediately decolorises soda-alkaline potassium permanganate in the cold. It also slowly reduces ammoniacal silver nitrate with deposition of metallic silver.

The substance completely inhibits the growth of the LSHTM strain of *Staph. aureus* at a concentration of 1:64,000 and partially inhibits growth at 1:128,000.

A freshly made solution of patulin in distilled water is colourless, but after standing for about 14 days at

y tinge is observable and the
h colour with ferric chloride.
us 10 ml. of a M/20 aqueous
17 days at room temperature,
NaOH for neutralisation to
solution of patulin is treated
with KIO_4 little or no action occurs, but after a preliminary cold hydrolysis of patulin by N/10 NaOH (see below) there is a rapid utilisation of 2 mol. of KIO_4 (in ½ hour) with the production of 1 mol. of formic acid and about 0·8 mol. of CO_2. No volatile aldehydes were detected.

DERIVATIVES OF PATULIN

(1) *Acetyl derivative.*—A mixture of acetic anhydride, 5 ml., and anhydrous sodium acetate, 1 g., was boiled. After cooling to 100° C., 1 g. of finely powdered patulin was added, the mixture shaken and allowed to cool to
room ten added with
stirring a crystallised.
After chil Wt., 1·18 g.;
MP 116–1 50% aqueous
ethanol, rless prisms,
MP 118° elting at the
same temperature. Found: C, 54·99, 54·93; H, 4·03, 4·12; C-methyl, 7·87, 7·65%. $C_9H_8O_5$ (i.e., $C_7H_5O_3{\cdot}O{\cdot}CO{\cdot}CH_3$) requires C, 55·11; H, 4·11; 1 CH_3, 7·66%. Since patulin contains no carbon-methyl groups the Kuhn-Roth estimation of carbon-methyl groups in acetyl patulin indicates clearly that this compound is a *mono*-acetyl derivative.

The acetyl derivative gave 0·31 active hydrogen atoms per mol. in pyridine at 25° C. and 0·24 active hydrogen atoms in anisole at 20° C.

Brady's reagent (2 : 4-dinitrophenylhydrazine in aqueous 2N HCl; 50 ml.) was added to a solution of
the acetyl derivat
yellow crystalline
time was collecte
It proved to be
patulin (see next section), with the same crystalline form, behaviour on heating and analysis. Found: C, 46·19; H; 3·26; N, 16·9%. $C_{13}H_{10}O_7N_4$ requires C, 46·72; H, 3·02; N, 16·8%. The acetyl derivative is thus very easily hydrolysed by cold dilute mineral acid.

(2) *Mono-2 : 4-dinitrophenylhydrazone.* — Brady's re-
agent (2 2N. HCl, 500 ml.)
was add 0·2 g., in water,
20 ml. pitate which first
appeared after 15 min. was separated by filtration after 3 hours, washed with water and dried. Wt. 0·1 g. It was recrystallised from methanol and formed long yellow needles, which on heating turned red at 185° C. and as the temperature was raised to 310° C. gradually darkened without melting. Found: C, 46·83, 46·83; H, 3·36, 3·10; N, 16·4, 16·5%. $C_{13}H_{10}O_7N_4$ requires C, 46·72; H, 3·02; N, 16·8%. That this derivative is a *mono*-2 : 4-dinitrophenylhydrazone is indicated by the analysis
and b alcoholic
potas aqueous
sodiu aqueous
potas

(3) .) filtered
solutio 1 g., in
patulin, 0·2 g. Patulin
orange plates separated,
63·50; H, 5·06; N,
, 63·93; H, 4·94; N,
11·4%.

The derivative is not a pyrazoline since it gives a negative Knorr's reaction with $K_2Cr_2O_7$ and conc. H_2SO_4.

ALKALINE HYDROLYSIS OF PATULIN

(*a*) *In the cold with excess of NaOH.*—A M/20 aqueous solution of patulin, 5 ml., was treated in a stoppered flask with an excess of N/10 NaOH, 10 ml. A bright yellow colour developed, and after standing at room temperature for 2 hours 5·20 ml. of N/10 HCl was required for neutralisation to pH 7 (bromothymol blue, fugitive end-point). The acidity unmasked is therefore equivalent to 4·80 ml. N/10 acid; theoretical, for 2 equivalents of acid, 5·00 ml. The neutralised solution (solution A) was acidified by the addition of 10 ml. of N/10 HCl and this solution was held at room temperature for 24 hours, after which time 0·25 ml. N/10 NaOH was required for neutralisation to bromothymol blue, pH 7 (solution B). The decrease in acidity, probably due to ring closure, is therefore 0·75 ml. of N/10 acid; theoretical, for complete ring closure, 5·00 ml. of N/10 acid.

No deep-seated change appears to take place on treating patulin with an excess of cold sodium hydroxide as described above since no formic acid could be detected (cf. section (*c*) below) so that it may be concluded that reversion from structure 2 to structure 1 can only be brought about to a small extent by simple acidification. This conclusion is supported by the fact that in solution A patulin (and/or its reaction products) had an antibacterial activity of 1 : 800; in solution B 1 : 2,000; and in the control untreated solution 1 : 60,000. Further, both solutions A and B gave a strong red colour with ferric chloride whereas the parent substance gives no colour with this reagent.

(*b*) *In the cold with 1 equivalent of NaOH.*—A solution of patulin, 0·462 g. (≡ 3 milliequiv.) in water, 20 ml., was treated with cold N/10 NaOH, 30·00 ml. The mixture, which reached a maximum yellow colour in ¼ hour, was held at room temperature for 18 hours. Final pH, 6·5. The antibacterial activity of this solution was about a third of that of a freshly made aqueous solution of the same concentration (0·462 g. of patulin in 50 ml. of water); 40 ml. of the alkali-treated solution were extracted with ethyl acetate. Wt. (cor-
ecovered = 0·1176 g.
t.
dding the NaOH more
slowly. To a solution of patulin 0·151 g. in water, 10 ml., a few drops of thymol-phthalein were added. N/10
NaOH was now added d to
the first tinge of blue. om
time to time as the blue tal
of 10 ml. had been added. The mixture was held at room temperature overnight and was then extracted with ethyl acetate. Wt. (corrected) of patulin recovered = 0·0453 g. ≡ 29% of that originally present.

(*c*) *On heating with excess of NaOH.*—More extensive degradation of patulin takes place when it is heated with NaOH. This was demonstrated as follows:

A solution of patulin, 2·0039 g., in water, 5 ml., and N/1 NaOH, 50·00 ml., was made. On standing for a short time the solution became bright yellow and gave a red ferric chloride reaction. *It was then boiled, under reflux and in an atmosphere* of oxygen-free nitrogen, for 40 min., when the colour of the solution changed to reddish-brown. Titration of the solution, which no longer gave a colour with ferric chloride, showed that 24·1 ml. N/1 acid had been formed (calculated *for 2 equivalents of acid, 26·0 ml.)*

Thus 1·85 equivalents of acid per mol. of patulin had been formed, which quantitatively is substantially the same as is formed on cold hydrolysis (see section *a*), but qualitatively is quite different, since formic acid was shown to be one of the products of hot hydrolysis as follows:

N/1 H_2SO_4 (25 ml.) was added to the neutralised solution and the volatile acids were separated by exhaustive distillation in vacuo at 40–45° C. The distillate was titrated with N/1 NaOH, and 9·0 ml. N/1 NaOH was required for neutralisation ≡ 0·7 equivalent of total volatile acids. The neutralised distillate was evaporated to dryness. Estimation of the formic acid content of the dried residue by Fincke's method (1913)—i.e., by reduction of $HgCl_2$ to Hg_2Cl_2—showed it to contain 0·675 equivalent of formic acid.

The *hydrolysis solution, from which volatile acids,* had been removed, contains a mixture of substances none of which has been satisfactorily characterised.

ACID HYDROLYSIS OF PATULIN

A solution of patulin, 1·068 g., in 2N H_2SO_4, 50 ml., was boiled for 6 hours under reflux in a stream of nitrogen which was bubbled through standard baryta. *No CO_2 was formed during the hydrolysis.* The hydrolysis solution was brownish-yellow; 1·8 equivalents of acid
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be
of alkaline hydrolysis. They

0·82 equivalents per mol. of patulin in separate experiments and on estimation by Fincke's method (1913) were shown to consist exclusively of formic acid. The identity of the volatile acid as formic acid was conclusively proved by isolation as the lead salt which was obtained as long colourless needles from water. Found: C, 8·47; H, 0·66; Pb, 69·3%. Calculated for $C_2H_2O_4Pb$: C, 8·08; H, 0·68; Pb, 69·7%.

The solution from which the volatile acids had been removed was extracted with ether in a continuous extraction apparatus. The yellow ether extract was dried over anhydrous sodium sulphate. On removal of the solvent there remained a pale yellow syrup (wt. = 0·52 g.), which partially crystallised on standing. It was tiled and the solid material was crystallised from ether-light petroleum (boiling-point 40–60° C.) and purified for analysis by sublimation in a high vacuum. Found: C, 49·96, 49·60; H, 5·65, 5·62%; equivalent by titration, 145·6. $C_6H_8O_4$ requires C, 49·97; H, 5·60%. Equivalent, titrating as a monobasic acid, 144.

The recovery yield of the purified hydrolysis acid was only about 10%, but large losses were unavoidable because of the nature of the primary ether extract which undoubtedly contains other hydrolysis products, the nature of which has not yet been established. Nevertheless, in spite of the small recovery yield, we believe that acid hydrolysis of patulin proceeds *ideally* according to the equation:

$$C_7H_6O_4 + 2H_2O \longrightarrow C_6H_8O_4 + H.COOH$$

General properties of the acid hydrolysis product, $C_6H_8O_4$.—The acid crystallises in colourless needles, MP 120° C. It is very soluble in ethanol or chloroform, moderately soluble in ether or benzene, and insoluble in light petroleum. It is optically inactive. It gives no appreciable colour with aqueous ferric chloride. It is a strong acid, blueing congo-red. It titrates sharply as a monobasic acid and without indication of the presence of a lactone grouping. It is almost devoid of antibacterial activity since it only gives partial inhibition of the growth of *Staph. aureus* at a concentration of 1:200.

The acid gave 1·39 active H atoms in pyridine at 18° C. and 0·52 atom in anisole at 18° C. A Kuhn-Roth estimation gave only 0·35 carbon-methyl groups, so that it is improbable that the substance contains such a grouping. It is not acted on by Malaprade's KIO_4 reagent (1934). Hence it cannot have a hydroxyl group attached to *either* of the carbon atoms adjacent to the CO group.

A solution of the acid, 0·71 g., in ethanol, 50 ml., was shaken in hydrogen with an active catalyst prepared from $PdCl_2$, 0·2 g., and norite, 0·5 g. Only 6·0 ml. of hydrogen were absorbed in 30 min. (calculated for uptake of 1 mol. of hydrogen, 110 ml.). Hence the acid does not contain a double bond.

Derivatives of the acid, $C_6H_8O_4$.—Identification as tetrahydro-γ-pyrone-2-carboxylic acid (*structure 3*).

(*a*) *2:4-Dinitrophenylhydrazone.*—Brady's reagent, 30 ml., was added to a solution of the acid, 0·10 g., in water, 2 ml. The resulting orange-yellow precipitate (0·15 g., MP 192° C.) was recrystallised from 80% aqueous ethanol. The dinitrophenylhydrazone was thus obtained as orange-yellow needles, MP 197° C. Found: C, 44·07; H, 3·93; N, 17·15%. $C_{12}H_{12}O_7N_4$ requires C, 44·42; H, 3·73; N, 17·26%.

(*b*) p-*Phenylphenacyl ester.*—The acid, 0·1084 g., was titrated with N/10 NaOH 7·44 ml. (equiv. 145·6). The solution was evaporated in vacuo to 2 ml. and the concentrate was heated with *p*-phenylphenacyl bromide, 0·2045 g., and ethanol, 8 ml. The crude reaction product, 0·16 g., was recrystallised from light petroleum (150 ml., BP 60–80° C.) and the ester was obtained as colourless shining plates (MP 139–140° C.). A mixture with authentic, synthetic, *p*-phenylphenacyl ester of tetrahydro-γ-pyrone-2-carboxylic acid (MP 139° C.) melted at 139·5° C. Found: C, 70·92, 71·20; H, 5·48, 5·66%. $C_{20}H_{18}O_4$ requires C, 71·01; H, 5·36%.

A mixture of the hydrolysis acid, $C_6H_8O_4$ (MP 121° C.) and authentic synthetic tetrahydro-γ-pyrone-2-carboxylic acid, purified by fractional sublimation in a high vacuum (MP 120° C.) melted at 120·5° C.

ACTION OF CONCENTRATED HYDRIODIC ACID ON PATULIN

Isolation of the reaction product.—A mixture of [illegible], 0·5 g. and conc. HI, 15 ml. (Δ, 1·7) was heated in a Zeisel apparatus in a stream of CO_2. The bath temperature was slowly raised during 1 hour to 130° C. and maintained at this temperature for a further ½ hour. The mixture was cooled, diluted with water and extracted 4 times with an equal volume of ether. The ether extract was washed with water and then with aqueous sodium thiosulphate and the ether was removed by evaporation. The crystalline residue, an iodo-acid, 0·55 g., was recrystallised from light petroleum (BP 60–80° C.), giving colourless, broad blades (MP 94° C.). Found: C, 28·77; H, 3·75; I, 49·85%. $C_6H_9O_3I$ requires C, 28·15; H, 3·54; I, 49·57%.

(*b*) *General properties of the iodo-acid.*—The iodo-acid does not contain a carbon-methyl group. Found: $-CH_3$, 0·8%. $C_6H_9O_3I$ requires for 1 carbon-methyl group, 5·87%. Perhaps the most striking property of the iodo-acid is the ease with which iodine is quantitatively eliminated as hydriodic acid in aqueous solution. This was demonstrated as follows:

The iodo-acid, 0·0980 g., was suspended in water and titrated with N/10 NaOH to phenolphthalein. The substance slowly dissolved, and at the point where all the substance had dissolved 5·00 ml. N/10 NaOH had been used. The substance continued slowly to neutralise more NaOH like a lactone. The final titration value after 3 hours (stable for 1 hour) was 7·63 ml. N/10 NaOH, giving an *apparent* equivalent of 128·4 (calculated for $C_6H_9O_3I$, titrating as a dibasic acid, 128·0).

The HI produced during the above reaction was estimated as follows:

The neutralised solution was acidified with N/10 H_2SO_4 (8 ml.) and extracted five times with ether (20 ml. each time). On removal of the ether an oil, 0·05 g., remained. The ether-extracted solution and washings were treated with $AgNO_3$ and the precipitated AgI was weighed. Wt. of AgI = 0·0889 g. ≡ 49·03% I in the original reaction product. $C_6H_9O_3I$ requires 49·57% I.

(*c*) *Reduction of the iodo-acid with Zn and HCl: identification of γ-keto-*n*-hexanoic acid.*—A mixture of the iodo-acid, 0·5 g., zinc filings, 5 g., and 6 N HCl, 15 ml., was heated on the water bath for 1½ hours. A further 10 ml. of HCl was gradually added during the reduction. The residual zinc was separated by filtration and the clear colourless filtrate was mixed with Brady's reagent (2:4-dinitrophenylhydrazine in 2N. HCl; 200 ml.). The orange needles which quickly appeared were separated by filtration, washed with dilute HCl and water and dried (wt. = 0·29 g.; MP 190° C.). The crystals were recrystallised twice by dissolving in warm ethyl acetate and adding light petroleum, and were finally obtained as orange-yellow needles (MP 190° C.), not depressed on admixture with an authentic synthetic specimen of the 2:4-dinitrophenylhydrazone of γ-keto-*n*-hexanoic acid (MP 190° C.). Found: C, 46·97, 46·83; H, 4·71, 4·55; N, 17·8, 17·95%. $C_{12}H_{14}O_6N_4$ requires C, 46·45; H, 4·55; N, 18·05%.

The identity of the substance obtained by reducing the iodo-acid with Zn and HCl as γ-keto-*n*-hexanoic acid, $CH_3.CH_2.CO.CH_2.CH_2.COOH$, was confirmed by converting a specimen of it, which was isolated by ether extraction of a second reduction, into its *p*-phenylphenacyl ester. This derivative was crystallised from hot alcohol and was obtained as colourless needles (MP 79° C.), not depressed on admixture with an authentic synthetic specimen of the *p*-phenylphenacyl ester of γ-keto-*n*-hexanoic acid (MP 79° C.). Found: C, 73·50, 74·4; H, 6·23, 6·03%. $C_{20}H_{20}O_4$ requires C, 74·06; H, 6·22%.

(*d*) *Oxidation of the iodo-acid with $KMnO_4$: isolation of succinic acid and an acid $C_6H_{10}O_5$.*—The iodo-acid, 1·024 g., was suspended in N/10 NaOH, 80 ml., and shaken until dissolved. After standing overnight the theoretical amount of Ag_2SO_4 (0·6236 g.) was added and the precipitated AgI was removed by filtration. To the filtrate N/1 NaOH, 8·0 ml., and $KMnO_4$, 0·8428 g. (2 atoms of oxygen) were added at room temperature. After standing for a few hours the precipitated MnO_2 was separated by filtration. The solution required 6·60 ml. of N/1 H_2SO_4 for neutralisation. A further 12 ml. of N/1 H_2SO_4 was added and the volatile acids were removed by evaporation to dryness in vacuo. The solid residue was extracted with ether, and by graded addition of light petroleum to the ether extract two crystalline fractions were obtained.

Fraction 1.—After purification this fraction (wt. 0·04 g.) finally melted at 186° C., not depressed on admixture with authentic succinic acid (MP 186° C.). Found: C, 40·76, 4; H, 5·19, 5·14%. Calc. for $C_4H_6O_4$: C, 40·67; 5·12%.

Fraction 2.—Wt. 0·09 g. after purification. This fraction, ich separated in the earlier fractions as colourless prisms plates, melted at 102° C., raised to 104° C. by sublimation a high vacuum. Found: C, 44·08, 44·06; H, 6·08, 6·87%. Equivalent, by titration, 167. $C_6H_{10}O_5$ requires C, 44·44; H, 6·22%. Equivalent, titrating as a monobasic acid, 162. This acid has evidently arisen by the reaction -CH = CH- → -CHOH·CHOH-. Further evidence of the presence of a double bond and of its position relative to the CO group in the hydrolysis product arising by the action of water on the iodo-acid is afforded by the action of phenylhydrazine.

(*e*) *Action of phenylhydrazine on the iodo-acid in presence of water.*—The iodo-acid, 0·2 g., was treated with a filtered solution of phenylhydrazine hydrochloride, 0·4 g., in water, 10 ml. containing crystalline sodium acetate, 0·8 g. Colourless needles (0·04 g.; MP 104° C.) separated, which on recrystallisation from hot water were obtained in very long slender needles (MP 105° C.). Found: C, 65·83; H, 6·33; N, 12·95%. $C_{12}H_{14}O_2N_2$ requires C, 66·03; H, 6·46; N, 12·83%. This derivative is a substituted pyrazoline since it gives an intense purple colour with Knorr's reagent (conc. H_2SO_4 and $K_2Cr_2O_7$). Hence the parent substance $C_6H_8O_3$, from which it arises contains the grouping -CH = CH-CO-. It is clear therefore from the evidence in sections *b*, *c*, *d* and *e* that the acid obtained by the action of water on the iodo-acid has the constitution, $CH_2 = CH.CO.CH_2CH_2.COOH$.

(*f*) *Condensation of the iodo-acid with malonic ester.*—The iodo-acid, 3·0 g., was esterified with a slight excess of ethereal diazomethane. There was a vigorous evolution of nitrogen. The ether was evaporated and the residual iodo-ester was used for the condensation.

Metallic sodium, 0·27 g., was dissolved in ethanol, 5 ml., and the solution was treated with diethyl malonate, 1·88 g. After 20 minutes the iodo-ester was added and the mixture was heated on the boiling water bath for 2 hours. The reaction product, 2·91 g., was extracted with ether and distilled in vacuo. The main fraction (1·03 g.; BP 160–164° C./1 mm.) was hydrolysed by boiling under reflux with conc. HCl, 2 ml., for 9 hours. The water and HCl were removed in vacuo and the residual crude solid was crystallised from ether (wt. 0·51 g.) and purified for analysis by sublimation a high vacuum. Colourless, clusters of plates, MP 3° C. Found: C, 51·21; H, 6·33; C-methyl, 0·54%. $H_{12}O_5$ requires C, 51·05; H, 6·43; for 1 C-methyl group, 0%. Since this acid does not contain a carbon-methyl group the position of the iodine atom in the original iodo-acid is fixed as on the terminal carbon atom. The iodo-acid therefore has the structure $CH_2I.CH_2.CO.CH_2.CH_2.COOH$ and is γ-keto-ε-iodo-*n*-hexanoic acid. The condensation product above, $C_8H_{12}O_5$, is γ-keto-suberic acid, $HOOC.CH_2.CH_2.CH_2.CO.CH_2.CH_2.COOH$.

CATALYTIC HYDROGENATION OF PATULIN

(*a*) *With palladium-norite-catalyst: uptake of 2 atoms of hydrogen.*—A solution of patulin, 12 g., in ethanol, 100 ml., was hydrogenated at ordinary pressure in the presence of a palladium-norite catalyst prepared from 0·5 g. of $PdCl_2$; 1690 ml. of hydrogen (corr.) was absorbed in the first half hour and the hydrogenation was stopped after a total uptake of 1924 ml. H_2 (corr.). (Theoretical for uptake of 2 atoms of hydrogen per mol. of patulin, 1745 ml.). The catalyst was removed by ration and the alcohol removed in vacuo. A colour s, water soluble oil (12·6 g.) remained which did not ystallise. A solution of this oil, 0·4 g., in water, ml., was treated with Brady's reagent, 100 ml. A eavy precipitate rapidly formed (wt. 0·50 g.). It was rystallised from ethanol and then methanol and was obtained as orange flattened needles (MP 201° C.). Found after drying in high vac. at 110° C.: C, 45·90; H, 3·57; N, 16·41%. $C_{13}H_{12}O_7N_4$ requires C, 46·43; H, 3·60; N, 16·66%. This compound is thus the 2:4-dinitrophenylhydrazone of dihydro-patulin, $C_7H_8O_4$, from which it follows that patulin itself contains at least one double bond which can be saturated by catalytic hydrogenation (1 mol. H_2).

(*b*) *With palladium-norite-catalyst: uptake of 4 atoms of hydrogen.*—A solution of patulin, 0·5 g., in ethanol, 8 ml., was hydrogenated at ordinary pressure with a palladium-norite catalyst prepared from $PdCl_2$, 0·2 g., and norite, 0·5 g.; 137·7 ml. H_2 (uncorr.) was absorbed in the first 10 minutes and a total of 160·0 ml. H_2 (corr.) in 20 minutes, when uptake was negligible and the experiment was terminated. (Theoretical for uptake of 4 atoms of hydrogen per mol. of patulin = 145·5 ml.). After removal of catalyst and solvent a colourless syrup (0·51 g.) remained which could not be induced to crystallise. An aqueous solution of the syrup gave only a trace of precipitate with Brady's reagent. It is therefore probable that uptake of 4 atoms of hydrogen per mol. of patulin under the above conditions leads to the saturation of one double bond (i.e., -CH = CH- to $-CH_2.CH_2-$) and reduction of the carbonyl group = CO to ·CHOH·.

(*c*) *With Adams's platinic oxide catalyst: uptake of 4 atoms of hydrogen.*—A solution of patulin, 5·0 g., in ethanol, 75 ml., was hydrogenated at ordinary pressure with Adams's PtO_2 catalyst, 0·2 g. (Voorhees and Adams 1922; Gilman 1932, p. 452). When no further uptake of hydrogen was observed a further 0·2 g. of catalyst was added and the hydrogenation was continued. The total uptake of H_2 at N.T.P. was 1680 ml., without correction for the hydrogen absorbed by the PtO_2; theoretical for uptake of 4 atoms of hydrogen = 1455 ml. The deep red solution thus obtained was shaken with air to coagulate the Pt, filtered and the alcohol was removed in vacuo. The product was a dark red oil (wt., 5·00 g.) which reacted acid to litmus.

(*d*) *Reduction of the PtO_2 hydrogenation product with HI and red phosphorus: identification of β-methylcaprolactone and β-methylcaproic acid.*—A mixture of the above oil, 5·00 g., hydriodic acid (Δ, 1·7), 50 ml., and red phosphorus, 2·5 g., was heated under reflux for 3 hours at a bath temperature of 150–160° C. After cooling the mixture, it was diluted with water and extracted with ether, the free iodine being removed from the ether by shaking with aqueous thiosulphate. On removal of the solvent a clear red oil (3·74 g.) remained. This was heated for 45 minutes under reflux with zinc, 20 g., and 6N, HCl, 50 ml., to remove combined iodine, and then re-extracted with ether. The ether solution contained a mixture of neutral substances, lactones and free acids. These were separated by the usual methods (see Birkinshaw, Oxford and Raistrick 1936) and gave the following fractions:

(1) *Neutral substances.*—0·03 g. of oil which was not examined further.

(2) *Lactones.*—Wt. 0·56 g. This fraction was converted into the phenylhydrazide as follows. A solution of it in ethanol, 2 ml., and phenylhydrazine, 0·56 g., was heated on the boiling-water bath for 2 hours. After cooling, ether was added and the solution was chilled. A crystalline product (wt. 0·12 g.; MP 142–144° C.) separated and a further crop (wt. 0·18 g.; MP 128–132° C.) was obtained from the mother liquors by evaporation to dryness and extraction of impurities with ether. The crude material was crystallised several times from ethanol to give finally colourless glistening plates, MP 162° C., not depressed on admixture with the phenylhydrazide prepared from synthetic β-methylcaprolactone (see section *e* below). Found: C, 66·40; H, 8·45; N, 12.45; C-methyl, 8·05%. $C_{13}H_{20}O_2N_2$ requires C, 66·07; H, 8·53; N, 11·86; for 1 C-methyl 6·36%, for 2 C-methyl, 12·72%.

(3) *Free acids.*—This fraction was distilled in steam. The distillate required 1·75 ml. N. NaOH for neutralisation to phenolphthalein. The neutralised distillate was evaporated to 2·0 ml. and the concentrate was heated with *p*-phenylphenacyl bromide, 0·48 g., and ethanol, 8 ml. There was isolated from the reaction mixture, as the main fraction, a crystalline solid (wt. 0·16 g., MP 48–51° C.). Recrystallisation from light petroleum gave colourless plates (wt. 0·09 g., MP 51–51·5° C.). A mixture of this substance with authentic synthetic β-methylcaproic acid *p*-phenylphenacyl ester (MP 52–52·5° C.) melted at 51–52° C. Found: on the product C, 77·41; H, 7·37%. $C_{21}H_{24}O_3$ requires C, H, 7·46%. (The MP of β-methylcaproic ester is given by Quebedeaux and error, as 61–62° C.).

(*e*) *Synthesis of the phenylhydrazide of β-methyl-γ-hydroxy-*n*-hexanoic acid.*—α-Bromodiethylketone (33 g.; Pauly 1901) was condensed with sodium malonic ester, prepared by dissolving metallic sodium, 4·6 g., in ethanol, 50 ml., and adding diethyl malonate, 32 g. The resulting condensation product, diethyl β-propionylethyl malonate, was isolated from the reaction mixture in the usual manner and was obtained as an almost colourless oil (wt. 14·9 g., BP 115–118° C./3 mm.).

This ester was hydrolysed, and decarboxylated to the corresponding keto acid, by boiling it with 2 N. H_2SO_4, 150 ml., for 43 hours, when CO_2 evolution ceased. The cooled reaction mixture was extracted with ether and the acid was transferred to sodium carbonate solution. It was liberated by HCl and again extracted with ether. On removal of the solvent, β-methyl-γ-keto-*n*-hexanoic acid remained as a pale yellow oil, wt. 6·6 g.

This keto acid was now reduced to the corresponding hydroxy acid. It was dissolved in ethanol, 50 ml., and to the boiling solution metallic sodium, 11·6 g., was added during 10 minutes. Then 95 ml. of ethanol was gradually added so as to dissolve the remainder of the sodium in ½ hour. The cooled reaction mixture was diluted with water, 100 ml., the ethanol removed in vacuo and the residue acidified with 46 ml. of a mixture of conc. H_2SO_4, 50 g., and water, 50 ml. The acidified mixture, was boiled for 5 minutes, cooled and extracted with ether. The ether extract was washed with aqueous sodium carbonate. On removal of the solvent there remained 5·61 g. of an oil, fractional distillation of which gave 3·51 g. of the lactone of β-methyl-γ-hydroxy-*n*-hexanoic-acid—i.e., β-methyl caprolactone as a colourless oil (BP 225–230° C./762 mm.).

A mixture of this lactone, 1 ml., phenylhydrazine, 1 ml., and ethanol, 4 ml., was refluxed for 2 hours. The resulting phenylhydrazide was isolated and purified as described above under section (*d*) 2 lactones, and the phenylhydrazide of β-methyl-γ-hydroxy-*n*-hexanoic acid was thus obtained as colourless glistening plates, MP 151° C., alone or in admixture with the phenylhydrazide obtained by the degradation of patulin. Found: C, 65·94, 65·79; H, 8·49, 8·52; N, 12·0, 11·9%. $C_{13}H_{20}O_2N_2$ requires C, 66·07; H, 8·53; N, 11·86%.

We wish to thank the Therapeutic Research Corporation of Great Britain for providing a number of synthetic reference samples which were of great value in identifying breakdown products of patulin. We have had many helpful discussions during the course of the work with the research staffs of the Corporation. One of us (S. E. M.) is indebted to the Corporation for a grant which has enabled him to take part in the work.

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III. Preliminary Trial in the Common Cold

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The observations made in this laboratory with patulin, which was originally supplied by Professor Raistrick for chemotherapeutic tests in cancer, were uncontrolled and are therefore of no solid scientific value, but since they formed the starting-point of Commander Hopkins's investigation it may be of some interest to add a note to this report.

When the supply of patulin was received I was in the second stage of a severe common cold which had me indoors for two days. A watery solution of wn strength, but probably, judging by subsequent tests, at least 1 in 1000, was prepared and the nasal passages were thoroughly douched with it. The douching caused some pain, but since it was followed within an hour by a clearing of the nasal passages it was repeated twice with solutions of about a tenth the original strength. The third and last application of patulin was made about 9 PM. A night of undisturbed rest, the first for three days, was obtained and next morning I was completely well and back at work.

Experiments were next made to determine the strength of solution which does not cause an appreciable amount of pain after nasal douching; 1 in 20,000 is practically painless and solutions of this strength buffered with phosphate at pH 6·0, were prepared and offered to medical and non-medical friends for trial. The results obtained cannot be set down in exact form but most of the reports were sufficiently favourable to warrant a real trial under carefully controlled conditions.

Medical friends who used the solution provided, as would be expected, most useful information. One volunteer, Dr. A. P., treated what appeared to be a febrile cold which was later diagnosed as influenza; patulin did not reduce the temperature or shorten the duration of the disease but it did prevent the nasal symptoms and signs of the common cold which so often confuse the diagnosis of true influenza. Another medical friend, Dr. B. P., treated his cold and at once obtained alleviation; running at the nose started again next morning and was again checked. This continued for several days when it became obvious that the antra were full of pus. The antra were washed out and the patient had no further trouble.

Many people regard the common cold as an annoying inevitable minor illness suitably treated with contempt those few who are subject to frequent attacks, each which lasts several weeks and makes life a misery, d not take such a light-hearted view. The following note have been provided by Dr. B. D. P., who suffers severel and frequently:

Nov. 20–24, 1942. Kept indoors with a violent infectiou cold. Nasal passages blocked. No pus. Violent sneezing Nights disturbed.

Nov. 24. Forenoon: nose running. Neuralgic pains i bones of face. No fever but feeling miserable. At 12.15 PM gargled and douched nasal passages with solution of patulin Nasal passages cleared almost immediately. Gargling an douching repeated at 2.15, 4.45 and 9.15 PM. Slept near 10 hours breathing freely.

Nov. 25. Woke with nasal passages clear and dry. N cough. Slight huskiness of voice. Gargled and douched a 7.30 AM. No further treatment. Returned to work.

A sapper, RE, had a severe cold of 2 days' duration. H nasal passages were douched with a freshly prepared solutic of a strength of 1 in 5000; the douching was repeated twice the last time at 10 PM. Relief from the nasal stoppage an associated symptoms was quickly obtained and a good night rest followed. Next day the cold was better and no furthe treatment was needed.

These are the strikingly successful results. Of pro fessional observers, one only, Dr. I. M., reported n improvement at all.

The reports received from non-medical friends wer not sufficiently exact either as to duration of illness symptoms or effects of treatment to enable one to reac any conclusions. Several found nasal douching difficul or too much bother to carry out and consequently treatment in these cases was perfunctory; other appeared to exaggerate the beneficial effects. O balance it appeared that freshly prepared solutions o 1 in 5000 to 1 in 10,000 give a good chance of rapic amelioration of symptoms or even of a quick cure with weaker and old solutions the chances of alleviatio diminish.

Postscript.—Since the note above was written an opportunity to treat a cold from the beginning has occurred.

The cold started in the early hours of the morning with sneezing, headache and a hot running nose. The first treatment was made at 11 AM the same day; the nasal passages cleared rapidly and the watery discharge ceased. At 5 PM all the signs of a cold returned and treatment was renewed. Again relief was obtained but at 10 PM nasal discharge of clear fluid began again. Treatment before retiring to bed gave a good night's rest but symptoms returned next morning. During the second day nasal douching was carried out three times, but in spite of immediate relief to nasal blockage the cold was not cured. On the afternoon of the third day the cold finally cleared up. On the evening of the third day one small fleck of green pus was obtained by blowing the nose.

Thus the cold was not cured in the early stages but relief from nasal stoppage was obtained; this early period of a cold may be the period of virus infection and if it is it may be said from this closely observed case that patulin has no effect on the virus. The secondary stage of infection with gram-positive and gram-negative organisms was completely prevented and since it is an almost invariable rule that the purulent process continues with me for at least a week, patulin proved to be of great value.

IV. Biological Properties: Extended Trial in the Common Cold

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Preliminary experiments have been carried out to estimate the action in vitro of patulin against a number of the more common pathogenic aerobic organisms. For the reasons put forward by Fleming (1938) the bacteriostatic power of the drug has been estimated rather than its bactericidal action. In order that the results might be comparable with those obtained with other mould products the method adopted was, in the main, the serial dilutional technique used by Oxford (1942) in a similar investigation.

Serial dilutional method.—Standard heart broth at pH 7·2 containing 2% glucose, 1% peptone and 0·5% NaCl was used as the basal medium. The solution of patulin was prepared by weighing 25 mg. of the substance into a 100 c.cm. flask; adding 90 c.cm. of sterile distilled water and dissolving by gentle warming. The resulting solution was then quickly brought to boiling-point, cooled rapidly and brought up to the 100 c.cm. mark with sterile water. This gives a 1 : 4000 solution of patulin. The sterile basal medium was tubed in 4 c.cm. quantities and to each tube was added graded dilutions of patulin—e.g., 1 c.cm. of 1 : 4000 solution added to 4 c.cm. of medium gives a 1 . 20,000 dilution; 0·8 c.cm. of 1 : 4000 solution plus 0·2 c.cm. of sterile water a 1 : 25,000 dilution, and so on, using increasing quantities of sterile water and decreasing quantities of patulin solution. Thus each be contained 5 c.cm. of liquid, 1 c.cm. of sterile water ing added to the control tube. Different strengths of atulin solution were prepared as the work proceeded and hey became necessary.

Both cultures obtained from the National Collection of Type Cultures and organisms isolated in the laboratory where the investigation was carried out were used for testing. In the former case three successive generations (each of 24 hours) were grown in the basal medium before the test was carried out.

The tubes containing the sterile basal medium plus the dilutions of patulin were inoculated from glucose-broth cultures of the test organisms, a standard loopful (0·004 c.cm.) to each. Except in the case of weakly rowing organisms all cultures were diluted 1 in 1000 n the sterile basal medium before use. After sowing, he cultures were incubated for 24 hours at 37° C. and were then examined. Complete inhibition of growth was shown by the absence of any turbidity, partial inhibition by a growth which was obviously less than that in the control tube.

All tests were carried out in duplicate and have been repeated using different samples of patulin.

Experimental Findings

From table I it will be seen that patulin possesses bacteriostatic powers against a number of gram-positive and gram-negative aerobic organisms. The position with regard to the anaerobes is still under investigation but preliminary results show that the substance is active against this group also.

Compared with other mould products which have been olated during recent years, patulin differs from peni- illin, gramicidin and citrinin in that it shows no selective differentiation between gram-positive and gram-negative microbes. In this respect the drug is comparable with penicillic acid, and indeed the inhibitory figures published for the latter compound (Oxford 1942) are very similar to those shown in table I. Patulin is very much less active than is penicillin against gram-positive organisms, but the position is reversed with regard to the coli-typhoid salmonella group. For example, while patulin gives complete inhibition of *Salmonella typhi* at a dilution of 1 in 50,000, and complete inhibition of *Bacterium coli* at a dilution of 1 in 33,000, the figures for penicillin (Abraham et al. 1941) are 1 in 10,000 and less than 1 in 1000 respectively. In the same way, with the dysentery group patulin is a more efficient growth inhibitor than penicillin, the figures for *Bact. dysenteriæ* Shiga being 1 in 50,000 for the former drug and 1 in 20,000 (Abraham et al. 1941) for the latter.

Effect of serum.—In order to estimate the inhibitory effect, if any, of serum the dilution tests were repeated with the addition of 10% fresh human serum. *Staphylococcus aureus*, *Streptococcus pyogenes* and *Strep. pneumoniæ* were used as test organisms and the results obtained are shown in table II. In no instance was any inactivation observed.

Effect of pus.—In view of the projected trials of the substance in the treatment of common cold, it was important that its activity in the presence of pus should be estimated. This was carried out using "pus broth" as described by Florey and his colleagues (1941), and with *Staph. aureus*, *Strep. pyogenes* and *Strep. pneumoniæ* as test organisms.

The pus was first "thinned" by incubation at 37° C. for 3 days, and after centrifugalisation one part of the supernatant fluid was diluted with two parts of broth to give a 33% pus broth. After filtration through a Seitz EK filter varying dilutions of patulin were added to this broth, which was then inoculated in the usual way with the test organisms, incubated for 24 hours at 37° C. and examined. Pus broth without the addition of patulin was used as a control and the test was carried out in parallel with 2% glucose broth.

TABLE I—BACTERIOSTATIC ACTION OF PATULIN USING 2% GLUCOSE BROTH

Test organism	Limiting dilution for inhibition			Notes
	Complete	Partial	None	
Staph. aureus ..	50,000	..	80,000	Coag. + ve from abscess
Ditto ..	33,000	.	50,000	Coag + ve from osteomyelitis
Ditto ..	33,000	50,000	100,000	Two strains: NCTC 3095 and 3750
Ditto ..	50,000	..	100,000	NCTC 3761
Strep. pyogenes	80,000	..	100,000	Lancefield A from throat
Ditto ..	33,000	50,000	80,000	NCTC 2432
Strep. viridans ..	33,000	..	50,000	NCTC 3160
Strep. pneumoniæ	80,000	..	100,000	Group 3
S. typhi ..	50,000	..	80,000	..
Ditto ..	50,000	..	80,000	NCTC 2128
S. typhi. para A	80,000	100,000	150,000	..
S. typhi. para B	50,000	..	80,000	..
Ditto ..	33,000	..	50,000	NCTC 14
Bact. coli ..	33,000	50,000	80,000	NCTC 80
B. dysenteriæ Flexner	80,000	..	100,000	..
B. dysenteriæ Shiga	50,000	80,000	100,000	..
B. proteus ..	33,000	50,000	80,000	NCTC 401
M. catarrhalis ..	80,000	100,000	150,000	..

The results in table II show that in no instance was any antagonistic effect observed.

Effect on leucocytes.—The in-vitro effect of patulin on the phagocytic activity of leucocytes has been tested using the method described by Thrower and Valentine (1943).

Saline dilutions of the drug were prepared ranging from 0·4% to 0·0125%; 0·2 c.cm. of each dilution was added to an equal volume of reconstituted blood and the tubes were incubated at 37° C. for 3 hours. A tube containing saline

TABLE II—DILUTION TESTS, SHOWING THAT SERUM AND PUS DO NOT INTERFERE WITH BACTERIOSTATIC EFFECT OF PATULIN

Test organism	Highest dilution producing complete inhibition		
	2 % glucose broth	Glucose broth +10 % serum	Pus broth
Staph. aureus ..	33,000	33,000	33,000
Strep. pyogenes ..	80,000	80,000	80,000
Strep. pneumoniæ ..	80,000	80,000	80,000

without the addition of the drug was used as the control. After 3 hours incubation a standard drop of heat-killed three-hour staphylococcal broth culture was added to each tube; the tubes were then shaken and incubated for 30 minutes. After incubation, films were made from each tube and a count was made, noting (*a*) the number of cells containing cocci and (*b*) the number of ingested cocci in 100 phagocytes.

The results showed that at 0·05% of patulin phagocytosis is inhibited; it is reduced at 0·025% but unaffected at 0·0125%.

Acute toxicity for laboratory animals.—Patulin has been administered intravenously to mice weighing between 20 and 25 g.; the results are set out in table III. Deaths occurring within 3 days were recorded. The average lethal dose is in the region of 0·5 mg. per 20 g. With the higher dosage levels (1 mg. and 1·5 mg. per 20 g.) most of the animals appeared ill within 2 hours of the injection and died within 6 hours. In a number of instances death was immediately preceded by convulsions, in one case so severe as to fracture vertebræ. On autopsy the lungs were found to be œdematous and grossly hæmorrhagic. On section the capillaries showed acute dilatation and the alveoli were packed with red cells. Similar capillary damage, but to a less degree, was seen in the liver, spleen and kidneys. Histological examination of the brain showed œdema, congestion of the vessels and a round-cell infiltration.

TABLE III—DETERMINATION OF LETHAL DOSE IN MICE

Intravenous dose (mg./20 g.)	No. of mice	Deaths within 3 days	Mortality %
0·25	30	5	16·6
0·5	20	13	65
1·0	20	17	85
1·5	5	5	100

The average lethal dose for a 20 g. mouse when the substance is administered subcutaneously is also in the region of 0·5 mg. When this amount is given dissolved in 0·2 c.cm. of water death usually takes place within 24 hours. Changes similar to those described when the intravenous route was used were found on autopsy. With smaller doses (0·25 mg. and 0·125 mg.) the mice survived but injection was followed first by œdema of the tissues and later by necrosis at the site of inoculation.

The findings in a rabbit are very similar. After an intravenous injection of 50 mg. (0·25 mg. per 20 g. body-weight) the animal went into convulsions and died at 14 hours. At autopsy, pleural and pericardial effusions were present and the organs showed the same changes as in the mice.

Treatment of the Common Cold

All epidemiological studies on the common cold go to show that the disease is prevalent throughout the world and that it is a very important factor in the morbidity-rate. In the United Kingdom the complaint is responsible for more absenteeism and loss of efficiency than any other disorder or group of disorders. Although a cold is usually regarded as a nuisance rather than a serious complaint, there can be no doubt that repeated attacks (and the average incidence is two attacks per person per annum) lead to serious and sometimes complications.

years past a cure for the common cold has been and numerous so-called specifics have had their advocates. None of these specifics, however, has fulfilled its early promise, and, as the saying goes, if a cold is treated energetically it will get well in seven days, while if left to itself it will get well in a week.

When patulin was isolated and preliminary tests in vitro had shown that it possessed bacteriostatic powers against a number of gram-positive and gram-negative organisms, a few observers decided to give the drug a personal trial in the treatment of common cold The results were encouraging and it was felt that th substance merited further trial in a larger group, unde controlled conditions. An investigation was therefor arranged in coöperation with the authorities at a larg naval depot.

Common cold is a generic term applied to a numbe of conditions affecting the respiratory tract, and it wa essential for an investigation such as this that som limited definition of a cold would have to be adopte and that only those cases which conformed to tha definition should be included in the series. Th definition adopted was in the main that of Horde (1932)—an acute specific catarrh involving the uppe respiratory tract, and in most cases the nose an pharynx. A cold runs a benign course of 3–10 days, with pyrexia and constitutional disturbance. Horder allow some degree of sinusitis, laryngitis or tracheitis in hi definition, but patients presenting themselves with such complications on first attendance were not included in this series. Moreover, patients with severe headache body aches, and in whom the diagnosis between influenza and common cold was indefinite were excluded Thus the type of case treated was an acute or subacute rhinitis with or without pharyngitis, and with or without slight pyrexia and constitutional disturbance—in other words, what the man in the street, who may be sneezing with his nose "stuffed up" or running and a dry throat, and is feeling thoroughly miserable, calls a "cold in the head."

The investigation was carried out in two parts:

Group 1.—A controlled series in which half the patients were treated with patulin and half with a control fluid.

Group 2.—In which selected observers suffering from colds were given supplies of patulin and asked to keep careful notes of their progress.

PREPARATION AND ADMINISTRATION

Patulin keeps well in a phosphate buffer solution adjusted to pH 6. This buffer solution is prepared as follows:

27·231 g. acid potassium phosphate ('Analar') is dissolved in a litre of distilled water; 57 c.cm. of N/10 sodium hydroxide is added to 250 c.cm. of the phosphate solution; the resulting solution is well mixed and then made up to a litre with distilled water.

The stock solution of patulin is prepared by dissolving 0·050 g. of the substance in 5 c.cm. of the buffer solution and diluting to 100 c.cm. with sterile distilled water. This stock solution keeps well; a supply which was kept for 3 months showed no evidence of deterioration. For ready use one part of the stock solution is diluted with nine parts of sterile distilled water to give a 1 : 20,000 solution of substance; two parts with eight parts of water to give a 1 : 10,000 solution, and so on. The solutions for use were prepared freshly each day and were used within twenty-four hours. The strengths used were 1 : 20,000 in the first batch, 1 : 10,000 in the second, and 1 : 5000 in the third batch. In group 2 a 1 : 10,000 solution was supplied.

The solution of patulin was applied locally to the *nasal passages and nasopharynx*. Patients in group 1 were treated by a sick-berth attendant who sprayed the nose and throat with a De Vilbiss atomiser. Patients in group 2 either sniffed it up from the palm of the hand or instilled it into the anterior nares with a pipette; some of the patients in this group also gargled with the solution. The patients in group 1 were treated every 4 hours. Some of the patients in group 2 applied the treatment every 2 hours, others every 4 hours. Approximately 4 c.cm. of fluid was used on each occasion, and in most cases treatment was continued for 24–48 hours. A few patients in the first batch were treated for three days, but in the later batches 48 hours was taken as the limit. The control fluid used in group 1 was equally diluted buffer solution.

RESULTS IN GROUP 1

Treatment of group 1, which was subdivided into three batches, was carried out at a Naval depot. Colds were rife at the time, and after a broadcast on the subject ample volunteers were forthcoming. The patients were first examined and the form here illustrated was filled up; if they conformed to the definition of common cold they were then directed to an attendant who treated alternate cases with a solution of patulin and the emainder with the control fluid.

Date / /43. Name Age Rating
Headache Shivering Coryza
Body pains Sore Throat Cough
Other symptoms
Contact ? Subject to colds ?
T. P. R.
Present condition :— Nose
Eyes
Fauces
Chest

Date.	Time.	Treatment.	Progress.

Duration of symptoms before treatment
Duration of symptoms after treatment
COMMENTS :—

Form used in Group I. The reverse has space for the findings on direct examination and culture of the nasopharyngeal swab.

The patients themselves did not know that the series was being controlled and were under the impression that they all had had the same treatment. With the third batch, to prevent the possibility of any bias on the part of those conducting the trials, until the results of treatment had been assessed, none of them knew which was the treated group and which the control.

Treatment was repeated four-hourly during the day, nd the patients were seen at the end of 24 hours and gain at the end of 48 hours, at which times improvement or otherwise was assessed. The assessment of results was by no means easy, for a cold, apart from rhinorrhœa, has but few objective signs, and one was forced to rely largely on the patient's statement. However, every effort was made to check a patient's statement that he was cured by physical examination and by interrogation as to why he had said so.

As might be expected, a certain number of men, both reated and controls, had made up their minds that they were going to be cured, and claimed complete alleviation of their symptoms when asked how they felt. Further questioning in such cases elicited the fact that although they felt better they were still suffering from such symptoms as some nasal discharge, a stuffed-up nose in the morning, &c. Only those men who, after questioning, were found to be completely symptom-free, who, on examination, had no objective signs were ssified as cures. In the first batch an attempt was ade to divide the patients into three groups; cured, mproved and worse, but because of the difficulty in ssessing improvement this method was abandoned, and atients in the subsequent groups were classified as ured or not cured. For convenience in statistical nalysis, the figures obtained in the first batch have been treated in a similar fashion, the improved and worse cases being classified as "not cured." The results obtained are shown in table IV; it will be seen that in each batch the treated patients show a much a higher percentage of cures than do the controls.

A large number of the cured patients noticed a great improvement after the first application of patulin, and were completely cured within 24 hours. The response to treatment could almost be described as dramatic; men who had been feeling miserable with a constant nasal discharge and a raw throat during the day and a stuffed-up nose on waking in the morning, reported 24 hours after treatment had been begun that they felt quite fit and that their nasal passages were dry and clear.

Other patients improved more gradually, but experience showed that if complete cure did not take place within 48 hours it was unlikely that patulin would have any apparent effect on modifying the course of the cold.

No ill effects were observed after treatment. Some patients (especially those in batch 3, when a 1 : 5000 solution was used) complained of a transitory stinging in the nose, immediately after they had been sprayed, and a number noticed that for about half an hour after treatment they had a profuse nasal discharge. That these effects were not due either to the buffer solution or to mechanical action is shown by the fact that none of the patients in the control group reported similar symptoms.

The failures may be divided into two groups—(a) patients who did not improve in any way, and (b) patients who showed transitory improvement which was not maintained or in whom complications developed. The second group is of some interest and mention may be made here of a relevant personal experience.

For many years I have had at least one severe cold each winter. These attacks may be described as typical common colds; they start with vague malaise, a dry throat and slight pyrexia and are closely followed by sneezing, profuse nasal discharge and completely blocked nasal passages on waking in the morning. The acute symptoms usually persist for 4–5 days and are followed by a purulent nasal discharge which lasts for about a week. A few years ago one of these attack culminated in a severe pan-sinusitis, which, however, cleare up with conservative treatment. During the time that patulin was undergoing clinical trials I noticed the premonitory symptoms of a cold, and 12 hours later when the attack had fully developed I started treatment using a 1 : 10,000 solution of patulin every 4 hours. Next morning—i.e., some 20 hours later—I woke up feeling completely cured and without a trace of nasal discharge or blockage of the nasal passages. The same night, however, symptoms of sinusitis (pyrexia, pain close to the inner canthus of the eye, together with generalised headache and vomiting) made their appearance.

TABLE IV—RESULTS IN GROUP I

Batch and month	TREATED			CONTROLS		
	Patients	Recovered	% recovered	Patients	Recovered	% recovered
1. January	54	24	44	41	1	2·4
2. February	23	16	70	26	3	12
3. April	18	15	83	18	4	22
Total	95	55	58	85	8	9·4

Two of my colleagues had similar experiences; after the use of patulin they noticed distinct but temporary improvement, but shortly afterwards both developed sinusitis; like myself, both had had previous attacks. It is probable that any focus which the solution cannot reach will keep the infection active in the nasal passages, and some of the failures in the treated group may have been due to the existence of a previous sinusitis. In 2 patients clinical and radiological evidence of such a condition was found; neither of these patients improved, but neither became worse nor complained of symptoms suggestive of an acute sinusitis.

RESULTS IN GROUP 2

Some 14 patients complaining of colds were given supplies of patulin and asked to keep notes of their progress. Of these, 10 reported a complete and rapid recovery. Of the remainder, one felt much better and 3 noticed no improvement whatsoever. Typical case-histories of the cured cases are as follows.

CASE 1. (Notes supplied by Dr. M. Maizels.)—A married woman, who usually has two bad winter colds, which always develop in the same way: thickness in nose, running eyes, sore throat. The cold is bad for 3 days and clears up in about 3–4 days. On the evening of Feb. 2 she noticed dryness and stuffiness of the nose and sore throat. Next morning she felt she had a very heavy cold coming—sneezing, fullness in ears, serous discharge from nose, eyes watering and throat dry at the back, but felt well in herself. She feels sure that this would have developed typically without treatment. Treatment began at 12 noon on Feb. 3; patulin was instilled as drops in the nose and snuffed up from the hand; the throat was gargled with patulin. Snuffing and gargling were repeated at 2.15, 4.15 and 6.15 PM on Feb. 3 and on the morning of Feb. 4. At 5 PM on Feb. 3, the patient said, her nose was streaming and the cold was getting worse. She woke up on Feb. 4 quite well!

CASE 2.—A man, who reported with a "streaming cold" of one day's duration. The predominating symptoms were malaise, headache, profuse nasal discharge and sore throat. Examination revealed a subfebrile temperature, slight faucial inflammation and acute rhinitis. Treatment consisted of 1 : 10,000 patulin every 4 hours during the day, and 24 hours after beginning treatment the patient reported that he was completely symptom-free. This was confirmed by examination. As a sufferer from colds he was convinced that his cold would have dragged on for a week or longer had he not been treated.

CASE 3.—A man, who reported with a heavy cold of several days duration. The predominating symptoms were a thick purulent nasal discharge during the day and completely blocked nasal passages, together with a sore throat, on waking in the morning. Treatment consisted of 1 : 10,000 patulin every 4 hours during the day. After the first application the discharges became very profuse and watery; 48 hours later all discharge had ceased and the nasal passages were clear and dry.

In addition to these cases, 27 WRNS personnel were treated with patulin. The results are given in the following report by the officer in charge of the trials.

"The first bottle of the substance was provided for my office staff and myself to try. The results were so successful that other officers asked to be allowed to use it, and have sent their ratings for treatment. As far as possible we have used it, as instructed, before a cold has lasted more than 24 hours

"Twelve officers and 14 ratings have reported completely successful results after not more than 24 hours' treatment. Included among these was a girl motor-transport driver who has had a series of very heavy colds; not a single attack has developed since she has used the solution. One officer and one rating reported partially successful results. Both of these are subject to colds which seem deep-rooted and last for 2–3 weeks. Both reported that the treatment gave them considerable relief and made them feel much less heavy headed, but the cold itself did not clear up immediately. The one real failure was in an officer who gets very heavy colds, accompanied by aches and pains and usually a rise in temperature. It did not seem to have any definite effect in her case."

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The bacterial flora of the nasopharynx was investigated in a number of patients in the controlled series. Swabs were taken before treatment was started and again when the patient was discharged cured, and an attempt was made to estimate both whether any organism predominated in the series as a whole, and whether any change took place in the bacterial flora after treatment.

All the swabs examined yielded a mixed growth, and, although different organisms predominated in different individuals, no one organism was predominant in the series. The most commonly found microbes were *Strep. pneumoniæ*, *Micrococcus catarrhalis*, and streptococci, both alpha and beta. The series was too small to warrant any definite conclusions, but the impression gained was that after treatment with patulin a distinct reduction of organisms took place.

Five cases of clinical influenza were treated with a 1 : 10,000 solution of patulin, used in exactly the same way as in colds. In these cases the onset was sudden, [illegible]che and generalised body pains were the pre-[illegible] symptoms, and apart from a dry cough [illegible] respiratory tract was not affected. Pyrexia persisted for 4–5 days. The course of the disease did not appear to be influenced in any way by the drug.

DISCUSSION

The ætiology of the common cold is not yet fully understood. Some workers adhere to the virus hypothesis, while others are convinced that organisms such as pneumococci, *M. catarrhalis*, streptococci, &c., are primary causes. With the ætiology and pathology of the complaint in such an unsatisfactory position it is difficult to give any considered opinion on the merits of a new curative agent, and the task is made more difficult because the duration and severity of colds varies enormously with the individual, time and place, and because the common cold is a self-limited disease.

For these reasons it is felt that although the results of the trials described in this paper are encouraging, no definite claims can be made for patulin until it has been given more extended trial in different localities.

Summary

Patulin is about equally bacteriostatic to both gram-positive and gram-negative organisms; it is much active than penicillin against gram-positive organi but much more so against gram-negative ones.

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The results obtained were encouraging, 57% of treated cases recovering completely within 48 ho compared with only 9·4% of the controls.

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V.—Statistical Note

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PROFESSOR OF EPIDEMIOLOGY AND VITAL STATISTICS IN T
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(London School of Hygiene and Tropical Medicine)

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It is evident that if two batches of pennies are toss the respective percentages of "heads" are likely differ, and the probability that any particular differen or a greater difference, would occur can be read calculated. The principle involved in this stock case fundamentally the same as in our problem, subje to a consideration I shall discuss later on.

The fundamental data are given by Hopkins in h table IV. The three sets—January, February a April—are not *in pari materia* and must not be aggr gated. There is no reason why the proportion of cu should be the same in different months. Common sense suggests that the differences of percentages are unlikely to be "chance" happenings and it will be enough to apply an exact test to the set most favourable to the hypothesis of chance deviation—the third set. Applying such a test (see Fisher, Statistical Methods for Research Workers, pp. 94–95) it is found that in random sampling so wide a divergence in favour of the treated would occur about 3 times in 10,000 trials. It is therefore an improbable happening. In one respect, however, treated and controls are not *in pari materia*; the former included a larger proportion of patients with symptoms of not more than one week's duration (44·4, against 33·3). But, as the following table shows and common sense suggests, this is not probably material, unless there were a special process of selection, or self selection—viz., only patients with especially "obstinate" colds presenting themselves for treatment.

—	TREATED			CONTROLS		
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It could, of course, be tested by subtabulation, but, in view of the fact that in the first two series the proportions of treated and controls with symptoms of not more than a week's duration were virtually the same (87·0 and 85·1%), and in these series the divergence is greater, the arithmetic is needless. We may certainly say that, taken as a series, the probabilities of drawing each pair from a common universe are extremely small. That conclusion is all that purely statistical reasoning can establish. To revert to the illustration, if an experiment were made with batches of coins fresh from the mint, and their respective percentages of heads differed in such a way that, tested as these data have been tested, a probability of, say, less than 3 in 10,000 emerged that they came from a common universe, no sensible person would infer that the mint coins were biased. He would conclude that either (1) the samples were not *in pari materia* (there had been some "trick" in tossing), or (2) a very improbable event had happened—as it would, on the average, some 3 times in 10,000 trials. He would do so because the a priori improbability of bias in the mint coins is exceedingly great. In our case there is no such a priori improbability that the antibacterial substance might accelerate a cure; that it does do so is a tenable hypothesis. But, and this is the point always to be had in mind, what the statistician has shown is *not* that the odds are so and so many thousands to one in favour of the hypothesis that the antibacterial substance does cure, but only so and so many thousands to one against the chance that such results would emerge without *some* differentiation between the groups. Whether at other times and in groups differently chosen the same differentiation would be found can only be known when further trials have been made.

I am indebted to my colleague, Dr. W. J. Martin, who carried out the arithmetical tests.

INTERSTITIAL EMPHYSEMA AFTER EXTRACTION OF A LOWER MOLAR

KENNETH McFADYEAN, M R C S
MEDICAL OFFICER TO THE POST OFFICE

AT 10.10 AM on May 22, 1943, a male postal worker, aged 40, had his lower left second molar extracted under local anæsthesia. The tooth was broken during the first attempt at extraction. A further injection of local anæsthetic was made and the roots successfully extracted, but with difficulty. The patient arrived home at 11 AM, and on looking in a mirror was shocked to find the left side of his face very swollen. At 1 PM he found great difficulty in swallowing solid food. At 2 PM he lay down to sleep but had to sit up because of respiratory embarrassment.

He was seen at 6 PM. At this time the upper line of demarcation of the facial swelling was immediately below the left molar bone, at which point the swelling stood out for about ¼ inch. From this point the swelling gradually increased as it descended to the mandible, and then decreased towards the base of the neck. The upper part of the swelling was firm; on palpation it presented a sensation of sponge rubber, and sounded like it on percussion. Here it was difficult to perceive air crepitus. Below this the swelling was softer and air crepitus was easily audible to the naked ear. On ausculation air crepitus could be heard throughout the entire swelling to the base of the neck. The suprasternal fossa was puffed out with a soft swelling in which crepitus was easily heard. There were no signs of emphysema in or around the orbit. The soft palate on the affected side was bulging over the posterior edge of an upper denture, while the left side of the pharynx was swollen to a point half way towards the middle line. There was no unusual laceration of tissues at the site of extraction, nor was there any suggestion that bleeding had been more than usual. There was no increase in the swelling after he was seen, and in his opinion there had been little increase after he reached home. The condition took a full week to subside.

Prof. H. A. Harris suggests that there was probably a laceration of either the mylohyoid muscle in the floor of the mouth or of the buccinator muscle in the vestibule of the mouth. In the former case, air may pass downwards into the loose deep fascia of the neck and upwards over the mandible anterior to the masseteric fascia and the overlying parotid gland. In the latter case, air may pass medial to the buccinator and backwards towards the pterygomandibular raphe and the soft palate; also lateral to the buccinator in relation to the space occupied by the corpus adiposum buccæ. The passage of air from face to neck or vice versa could take place near the anterior margin of the masseter at the lower border of the mandible, along the loose fascia surrounding the external maxillary (facial) vein and artery.

Two cases of interstitial emphysema after maxillary molar extraction are referred to by Collyer and Sprawson (1942), one reported by Turnbull (1900), and another by Binns (1935). In Turnbull's case a bugler had bugled immediately after the dental extraction, while in Binn's case the patient's wife said that he had tried to blow through a choked pipe shortly after the extraction. Two cases of emphysema after mandibular molar extraction have been reported in America. In the first, reported by Schaefer and Williams (1933), the condition was ascribed to the use of compressed air irrigators. In the second, reported by Hopkins (1935), the extraction was of an impacted molar and apparently required a lengthy operation. Hopkins found the emphysema to extend upwards to the scalp and down to the breasts. Another case, reported in France by Houzeau (1936), followed an easy and complete extraction of a lower right third molar; no explanation was offered.

A case of unilateral interstitial emphysema of the face was reported by Kirby in 1910, but this developed as the result of drying the pulp cavity of an incisor root, to which it was intended to fit a crown, with an electropneumatic hot-air syringe. Extraction was performed after the development of the emphysema. The root was found to have a large apical foramen. Kirby does not state whether it was an upper or lower tooth.

In the case now reported no suction or compressed air was used. The patient said that on the way home he kept the left side of his face covered with his hand because his jaw was aching, and that he kept his mouth closed to prevent cold air getting into his mouth. It is possible that local pressure on the cheek overlying the socket was painful, though general pressure over the side of the face was comforting. Thus, with the mouth kept firmly closed, air may have been driven into the vestibule to blow out the cheeks and keep pressure off the painful socket.

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MEDICAL OFFICER TO THE POST OFFICE

AT 10.10 AM on May 22, 1943, a male postal worker, aged 40, had his lower left second molar extracted under local anæsthesia. The tooth was broken during the first attempt at extraction. A further injection of local anæsthetic was made and the roots successfully extracted, but with difficulty. The patient arrived home at 11 AM, and on looking in a mirror was shocked to find the left side of his face very swollen. At 1 PM he found great difficulty in swallowing solid food. At 2 PM he lay down to sleep but had to sit up because of respiratory embarrassment.

He was seen at 6 PM. At this time the upper line of demarcation of the facial swelling was immediately below the left molar bone, at which point the swelling stood out for about ¼ inch. From this point the swelling gradually increased as it descended to the mandible, and then decreased towards the base of the neck. The upper part of the swelling was firm; on palpation it presented a sensation of sponge rubber, and sounded like it on percussion. Here it was difficult to perceive air crepitus. Below this the swelling was softer and air crepitus was easily audible to the naked ear. On auscultation air crepitus could be heard throughout the entire swelling to the base of the neck. The suprasternal fossa was puffed out with a soft swelling in which crepitus was easily heard. There were no signs of emphysema in or around the orbit. The soft palate on the affected side was bulging over the posterior edge of an upper denture, while the left side of the pharynx was swollen to a point half way towards the middle line. There was no unusual laceration of tissues at the site of extraction, nor was there any suggestion that bleeding had been more than usual. There was no increase in the swelling after he was seen, and in his opinion there had been little increase after he reached home. The condition took a full week to subside.

Prof. H. A. Harris suggests that there was probably a laceration of either the mylohyoid muscle in the floor of the mouth or of the buccinator muscle in the vestibule of the mouth. In the former case, air may pass downwards into the loose deep fascia of the neck and upwards over the mandible anterior to the masseteric fascia and the overlying parotid gland. In the latter case, air may pass medial to the buccinator and backwards towards the pterygomandibular raphe and the soft palate; also lateral to the buccinator in relation to the space occupied by the corpus adiposum buccæ. The passage of air from face to neck or vice versa could take place near the anterior margin of the masseter at the lower border of the mandible, along the loose fascia surrounding the external maxillary (facial) vein and artery.

Two cases of interstitial emphysema after maxillary molar extraction are referred to by Collyer and Sprawson (1942), one reported by Turnbull (1900), and another by Binns (1935). In Turnbull's case a bugler had bugled immediately after the dental extraction, while in Binn's case the patient's wife said that he had tried to blow through a choked pipe shortly after the extraction. Two cases of emphysema after mandibular molar extraction have been reported in America. In the first, reported by Schaefer and Williams (1933), the condition was ascribed to the use of compressed air irrigators. In the second, reported by Hopkins (1935), the extraction was of an impacted molar and apparently required a lengthy operation. Hopkins found the emphysema to extend upwards to the scalp and down to the breasts. Another case, reported in France by Houzeau (1936), followed an easy and complete extraction of a lower right third molar; no explanation was offered.

A case of unilateral interstitial emphysema of the face was reported by Kirby in 1919, but this developed as the result of drying the pulp cavity of an incisor root, to which it was intended to fit a crown, with an electro-pneumatic hot-air syringe. Extraction was performed after the development of the emphysema. The root was found to have a large apical foramen. Kirby does not state whether it was an upper or lower tooth.

In the case now reported no suction or compressed air was used. The patient said that on the way home he kept the left side of his face covered with his hand because his jaw was aching, and that he kept his mouth closed to prevent cold air getting into his mouth. It is possible that local pressure on the cheek overlying the socket was painful, though general pressure over the side of the face was comforting. Thus, with the mouth kept firmly closed, air may have been driven into the vestibule to blow out the cheeks and keep pressure off the painful socket.

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TUBERCULOSIS SURVEY AT A MENTAL HOSPITAL BY MINIATURE RADIOGRAPHY

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IT has long been recognised that there is a high incidence of pulmonary tuberculosis in mental hospitals. Mott in 1909 investigated the tuberculosis situation in all the London county asylums and estimated that 2 % of the patients were suffering from active pulmonary tuberculosis and he pointed out the difficulties in the diagnosis of these cases. The rise during the last European war was noted by Evans (1927); in 1918 the mortality per 1000 residents in mental hospitals for tuberculosis was 51·8 all forms and 45·6 for pulmonary alone.

More recently Deegan, Culp and Beck (1942) made a tuberculosis survey of a mental hospital in the United States, their attention being drawn to the problem by the unduly high incidence of pulmonary tuberculosis among the staff of the hospital. Their survey was made by X-ray examination of all patients and staff on 14 in. by 17 in. films, supplemented by sputum examination where possible; and they concluded that 2·2 % of the patients and 1·5 % of the staff had active pulmonary tuberculosis. They found that the determination of activity among patients was difficult and for this purpose relied chiefly on serial X-ray films.

In this country, Berrington and Greenwood (1942) recently made a survey of a mental hospital using primarily the erythrocyte sedimentation-rate (ESR) as an indicator and radiographing all those with an ESR over 14 mm.; 384 chest films were taken, and it was considered that 8 % of the 1100 patients investigated showed X-ray appearances of active pulmonary tuberculosis.

Attention has recently been drawn to the problem in Parliament, when a reply by the Minister of Health showed that the number of deaths from tuberculosis in the mental hospitals of England and Wales in 1942 was more than double those of 1938.

The report of the Medical Research Council on tuberculosis in war-time also draws attention to the observed increase of tuberculosis in mental hospitals and recommends that early diagnosis should be attained by periodic chest X-ray examinations of all patients in these institutions.

PRESENT INVESTIGATION

In order to determine the incidence of pulmonary tuberculosis in the Leavesden LCC Mental Hospital, it was decided to examine all patients and staff by miniature radiography, which allows of much saving in time and cost as compared with full-size radiography. At this hospital there has been, since 1939, a considerable increase in the observed death-rate from pulmonary tuberculosis among male patients, but not among the females (figs. 1 and 2).

Method.—The existing 4-valve Dean model X-ray plant was adapted to the miniature technique by Messrs. Kodak Ltd. A special camera incorporated in a light-proof tunnel was constructed and this could be attached direct to the screen. The camera contained up to 100 ft. of film and was fitted with a Dallmeyer 2 in., focal length 0·5, lens and was used in conjunction with a Rotalix tube. The set was operated at 200 milliamps with an average kilovolt pressure (kVP) of 60 and exposure time of 0·15 sec.; the latter remained constant for most patients, the kV being varied according to the thickness of the patient's chest. The exposure time was kept as short as possible because these patients were liable to move. Identification cards were made out for each subject and these were photographed on the miniature film at the time of exposure. After careful processing the films were examined by projection up to an approximate size of 8 in. by 8 in.

In spite of the difficulty of marshalling and controlling uncooperative and often resistant patients, it was found possible to X ray 50 in 30 minutes. Satisfactory positioning of many of them was difficult, partly because deformities were common, and also because many could not coöperate by keeping still or "holding their breath"; as a result it was impossible to obtain satisfactory films in some cases.

Procedure.—2035 patients (938 males, 1097 females) and 224 members of the hospital staff were investigated by miniature X-ray examination. In order to complete the experiment, bedridden and deformed and even resistant patients were examined on 15 in. by 12 in. films. Further, all those patients previously notified to local authorities as cases of tuberculosis were similarly examined, so that in all 2271 inmates were the subjects of this survey and only 0·8 % of the inmate population were unable to participate in the test.

RESULTS

Patients.—Of the 2035 films, 153 were selected for re-examination on 15 in. by 12 in. films; of these 119 were suspicious of pulmonary tuberculosis in varying degrees, the remainder having some deformity or abnormality other than tuberculosis. It was found that some of the patients discovered in this way had previously been suspect on clinical grounds. Of these 119 cases, 12 males and 18 females showed evidence of widespread calcification in the lungs, while many others showed single or a few calcified nodules indicating that they had apparently recovered spontaneously from pulmonary tuberculosis. It was remarkable that only 3 of the newly suspected cases showed X-ray evidence of cavitation.

A full investigation was made in each of the 119 suspects and comprised: physical examination; temperature and weight recordings; sputum examination (when obtainable); blood ESR and monocyte-lymphocyte ratio; the culturing of fæces and of products of gastric lavage for tubercle bacilli; Mantoux reaction; and D'Amatos test (leucopenia after injection of tuberculin). These diverse investigations were called for because it was apparent that the distinction between the active and inactive case presented unusual difficulties. In these patients, a high proportion of whom are low-grade mental defectives, respiratory movements are poor and physical signs difficult to elicit, sputum is usually unobtainable because it is often swallowed; indeed, no specimen was found to contain tubercle bacilli, while only 4 stomach washouts returned positive results despite intensive search. Almost complete loss of the cough reflex in most cases makes the laryngeal mirror test of little use. Moreover, these patients are asymptomatic or are incapable of giving a connected account of themselves; cough is not a prominent feature and since the war a considerable percentage of all inmates have lost weight.

Some of these tests are admittedly of doubtful value in assessing the activity or otherwise of a case, but taken together they constitute a pointer. Certainly we do not feel that a diagnosis of activity or otherwise should be made on the X ray alone.

As a result of these tests and the X-ray films, 32 new active cases of pulmonary tuberculosis have been discovered (19 male, 13 female) by the miniature survey, although only 4 of these have been confirmed bacteriologically. In addition about 50 cases show definite X-ray appearances of pulmonary tuberculosis, and though these seem at the moment to be inactive they will require close future observation.

In the 183 patients of whom 15 in. by 12 in. films only were taken, skeletal defects often made diagnosis difficult. In all, 20 were selected as requiring full investigation and of these 4 were judged to be cases of active pulmonary tuberculosis. In addition, 7 showed evidence of widespread calcification in the lungs. A total of 36 active cases was therefore revealed.

The "already notified" cases of pulmonary tuberculosis in Leavesden numbered 48 (28 males; 20 females) and all were examined radiographically on 15 in. by 12 in. film; 19 (9 males, 10 females) showed either no evidence of pulmonary tuberculosis or minimal healed lesions only, and they could reasonably be removed from the tuberculosis wards.

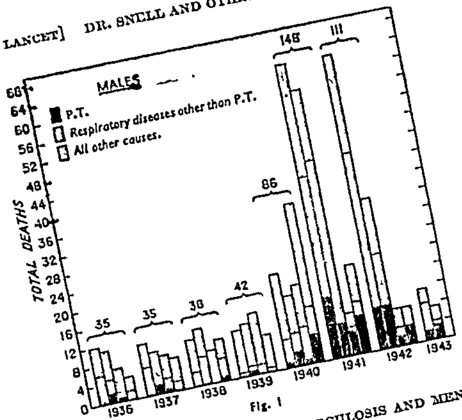

Fig. 1

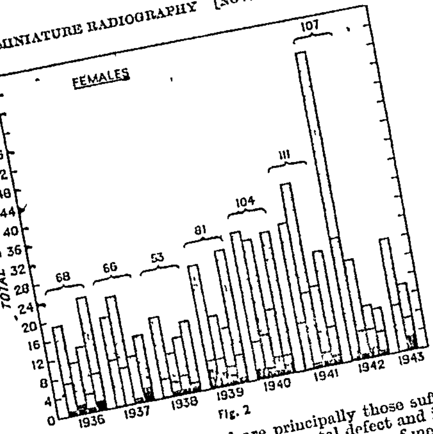

Fig. 2

ASSOCIATION OF PULMONARY TUBERCULOSIS AND MENTAL DEFECT

Active or doubtfully active pulmonary tuberculosis was found in the following percentage in the various types of defect, as a result of the radiographic survey:

	Cases at risk.	%
Idiots	162	0·6
Imbeciles	907	2·5
Feeble minded	691	0 9
Psychotics	475	2·5
	(M 4%, F 1·8%)	

The relatively high incidence in the imbecile group is probably attributable to their degraded habits, and the difficluty of supervising them when they are ambulant. The idiot group, on the other hand, includes a high proportion of "chair cases" who are relatively immobile and, although degraded in their habits, are under such strict hygienic control that they are in some respects less liable to contract infection than higher-grade patients.

Age-incidence.—The age-incidence of the 32 active cases was compared (fig. 3) with the numbers at risk in the hospital, the latter columns being reduced to 1/10th. It will be seen that the incidence of pulmonary tuberculosis in these patients does not agree with the curves found in the general population. The incidence in younger patients is comparatively low and the higher age groups are chiefly affected—e.g., there was an incidence of 4 4% in males aged 50–59, and 10 suspects occurred in the over 70 group.

STAFF

Miniature films were taken of all staff who consented, 224 in number (M 105; F 119); 37 males and 5 females refused examination. As a result, 9 large films were taken and 3 of these seemed to show evidence of pulmonary tuberculosis. It transpired that one was a previously notified case, one resigned before clinical investigations were completed and the third showed no clinical evidence of activity.

TOTAL INCIDENCE

The sum of the newly discovered cases, active and inactive, showing widespread calcification, and the cases of tuberculosis which had previously arisen among the hospital patients indicates that about 6% of the inmates are suffering from or have at one time had pulmonary tuberculosis, while the present percentage of active cases seems to be between 2 and 2 5%. This is about the same figure as was found in all the London county asylum by Mott in 1009 and by Deegan et al. in 1012.

DISCUSSION

Although the numbers of new cases of pulmonary tuberculosis disclosed are not large, their segregation and the close observation of the apparently inactive cases should help to reduce the future incidence of the disease.

The patients investigated are principally those suffering from some form of congenital mental defect and it is quite possible that the incidence in other types of mental disease may be different. Mott, referring to the incidence of pulmonary tuberculosis at Leavesden during the years 1003 to 1007, cites Dr. Elkins's figures indicating that 30% of all deaths that occurred at Leavesden were due to active phthisis (05% of these were confirmed by autopsy). It is true that predominantly the same type of case is under care at Leavesden now and that the incidence of pulmonary tuberculosis and the death-rate from that disease is now high; but it would be quite unjustifiable to conclude that a high death-rate from tuberculosis is inevitable or even usual in institutional mental deficiency practice. Indeed, except for the high death-rate attributable to this cause during these two great wars, the actual number of deaths from, and the incidence of, pulmonary tuberculosis have steadily declined. For example, during the years 1030, 1937 and 1038, pulmonary tuberculosis was responsible for 6 3% of all male and 6 0% of all female deaths at the hospital. Furthermore, the incidence of pulmonary tuberculosis among female patients continues to be low and the war-time increased fatality-rate is a phenomenon confined to the male cases. It is not within the province of this paper to speculate on why this is the case but it is manifest that improved amenities and care have improved the situation since Mott's survey.

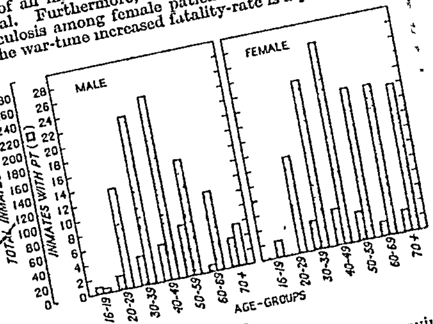

Fig. 3

The chief clinical interest lies in the type of pulmonary tuberculosis which has been demonstrated. These mental defectives lead an inert, vegetative existence, their movements being limited by deformity or lack of volition, their respiratory movements are reduced and the cough reflex itself seems to be greatly depressed. In many of them the disease process itself appears to follow a subclinical and comparatively benign course, resulting in spontaneous cure. The lack of symptoms, the rareness of cavitation and frank hæmoptysis, the negative bacteriology and the incidence of widespread calcification, all support this view. No doubt the ordered conditions of life in the mental hospital conduce to a favourable outcome. Not all cases, however, as is shown from the number of deaths from tuberculosis which are actually recorded, behave in this way; but even in these the disease runs an asymptomatic course until its ultimate stages.

Illustrating the acute type of case, is the fact that since the radiographic survey some 8 months ago, 15 patients who were examined have died of pulmonary tuberculosis; 6 of these 15 were not suspected on examination on the miniature films and a recent review of these films fails to show any definite evidence of tuberculosis, though the X rays are of rather variable technical quality. A 15 in. by 12 in. film of good quality was taken of one of these patients at the same time, and this again shows quite clear lung fields; yet this patient had died of active pulmonary tuberculosis within a month.

The post-mortem appearances of the lungs of these cases are interesting in that they show racemose and miliary tuberculosis, patches of consolidation, caseation and small recent cavities full of caseous material. In many, small intestinal ulcers and caseating lymph-nodes in the mesentery were discovered. In one case there was tuberculous disease in the temporal lobe of the brain and in another tuberculosis of the knee-joint, which might have been the primary focus of existing miliary spread. This type of very acute case seems to be becoming more noticeable since the beginning of the war.

SUMMARY AND CONCLUSIONS

Series of 2035 patients and 224 staff of Leavesden Hospital have been examined by miniature radiography.

A group of 183 bedridden and deformed or resistant patients and already notified cases have been examined on 15 in. by 12 in. films.

Exhaustive clinical and pathological examination of suspects has been undertaken.

The examination detected 36 apparently new cases of pulmonary tuberculosis; in addition 87 cases, including 37 showing widespread calcification, seemed to have inactive lesions.

Of the "already notified" cases 19 did not, in fact, show evidence of active pulmonary tuberculosis.

The total incidence of tuberculosis (active, inactive and cured) is estimated at 6%, of which 2% are active.

The unusual clinical type of pulmonary tuberculosis in these cases is described.

No case of active tuberculosis was detected in the hospital staff, but 3 were "suspects."

Asymptomatic cases can be detected by chest X-ray examination.

The miniature X-ray film proved its value in economy in time, labour and cost, but these patients provided a peculiarly difficult group from which to obtain satisfactory films, and the routine use of 15 in. by 12 in. films would normally seem to be preferable, although the possible use of a 4 in. by 5 in. mass-radiography unit for large-scale surveys of mental patients should be seriously considered.

We have to thank Dr. W. Allen Daley for the interest he has shown in this paper, Dr. R. M. Stewart for his assistance, and Dr. R. Cruickshank and Dr. H. Angell Lane for the pathological work; also Messrs. Kodak Ltd., for providing the apparatus and to their representative, Mr. J. L. Crooks, who was responsible for taking and processing the miniature films.

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Pharmacists' Gift to China.—The Pharmaceutical Society of Great Britain has made arrangements to send from London a representative collection of 49 volumes to form the basis of a pharmaceutical library for the Pharmaceutical Society of China, which now has its headquarters at Hsinchiao, Chungking.

Medical Societies

ROYAL SOCIETY OF MEDICINE

At a crowded meeting of the section of experimenta medicine and therapeutics on Nov. 9, with Dr. R. D Lawrence, the president, in the chair, a discussion wa opened on

Penicillin

Prof. Alexander Fleming, frs, told how abou fourteen years ago he had noted the inhibitory effec on staphylococci of the mould *Penicillium notatum* whic had accidentally contaminated one of his plates. Bein interested in "natural antiseptics" he had preserve and grown the mould and found that culture filtrate contained an inhibitory substance active against variety of organisms. This he named penicillin. Bu the early filtrates were weak and attempts at concentration failed until the brilliant success of Florey and hi colleagues reported in 1940. Thus penicillin therap became possible in suitable infections. For success i must be certain that the organisms are sensitive and th preparation of penicillin really potent. Because of rapi absorption and excretion, doses had to be repeate frequently if an effective concentration of penicillin wa to be maintained. After repeated penicillin injection it was possible to demonstrate inhibitory effects o streptococci or other sensitive organisms with blood serum diluted 1:1000 and with urine diluted 1:20,000 The action was, as with sulphonamides, bacteriostati and not bactericidal. On leucocytes and tissues ther was no toxic action and the synergistic effect of natura immunity processes should not be forgotten. The mos important step for future progress would be the analysi and synthesis of penicillin.

Prof. H. W. Florey, frs, paid tribute to his colleague who had shared with him at Oxford the work of developing penicillin. With cultures obtained from Professo Fleming, in media recommended by Professor Raistrick they had produced penicillin in amounts which permitte extraction and purification. The potency and purity of the product for clinical use were now many times those of the earlier preparations and were such that dilutions of 1:50 million to 1:100 million inhibited streptococc and dilutions of 1:256 million produced changes in the morphology of the organisms. Penicillin was effective against a range of organisms which included staphylococci, streptococci, pneumococci, clostridia, anthrax bacilli, gonococci, meningococci, and some others which though less sensitive might yet be brought within the scope of therapy. Coliform bacilli, *Proteus* and *Ps. pyocyanea* were insensitive; so also, most unfortunately, was the tubercle bacillus. Penicillin should be carefully handled to maintain its potency. It must be kept within a pH of between 5 and 7; it was destroyed by acids and alkalis, boiling, oxidising agents, some bacterial enzymes and heavy metals such as copper and lead. Its production on a large scale called for great skill and effort. Penicillin was non-toxic, and was not inhibited by pus, tissue autolysates, blood or serum. The number of bacteria present did not modify its effects; there was no need to seek the minimum dosage. The drug was rapidly excreted in urine, bile and saliva but was not found in tears or pancreatic juice. Rapid absorption took place from muscle or subcutaneous tissue, but the drug was destroyed, if given by mouth, by the HCl in the stomach. Rectal administration was ineffective because coliform bacilli destroyed penicillin. In man it was well established that coccal septicæmic infections could be cured by parenteral administration in doses of 15,000 units given every 3–4 hours. Failure were due to inadequate dosage, inactive preparations of penicillin or insensitive organisms. Major Scott Thomson had found that 4% of staphylococci were resistant to penicillin. Local administration also yielded successful results in suitable cases where adequate access and sustained application of sufficient amounts could be secured. Developments in surgical technique were important in furthering the success of local treatment. Instillation of solutions through tubes and insufflation of powder with an effective blower were the methods of choice. Through the cooperation of the Army it had been possible for Brigadier Cairns and himself to try out penicillin in North Africa in the treatment of war casualties. Their aim had been early treatment of wounds to prevent infection, and this first trial of penicillin in a new field had been highly successful. It had been possible by local and parenteral use of penicillin to close open wounds of soft tissues and bones. Under ordinary conditions infection made impracticable the closure of any war wound more than 6 hours old. But with penicillin infection could be prevented so that wounds could be closed. As a result healing was much more rapid and restoration of function more complete.

Professor Florey then showed a film—mostly in colour—which brought out clearly the technique of penicillin administration and demonstrated the admirable results of the new treatment under difficult conditions.

Flight-Lieutenant D. C. Bodenham, RAF, described the treatment of surface wounds with local applications of penicillin. The drug had been used in solution, as a powder diluted with sulphonamides and in a cream with a lanette wax and soft paraffin base. Surface wounds, gutter wounds, sinuses and cavities had all been treated with good results using remarkably small amounts of penicillin. It was important, however, to recognise that in complex cavities, such as the knee-joint, and in older lesions penicillin alone could not be expected to effect cures. It was necessary by surgical treatment to secure the best conditions for effective application of the penicillin.

Colonel E. C. Cutler, USAMC, described the combined method of local and parenteral administration of penicillin which had been used in treating wounded men from bombers. At the initial operation the wound was trimmed and 10,000–20,000 units of penicillin was applied locally as a powder or as a solution in 500 c.cm. of fluid. Thereafter 10,000 units was given parenterally every 3 hours. Treatment was controlled by estimations of penicillin in the blood and by daily cultures. Most of the results were good. Four men with compound fractures from whose wounds clostridia were cultured all recovered.

Mr. R. Vaughan Hudson, FRCS, paid tribute to the research workers whose efforts had made penicillin available. He quoted good results from the treatment of wounds by local application of penicillin. Of those considered for treatment about half had to be excluded chiefly because the organisms were insensitive. Complete sterilisation was not essential for healing; blood-supply, trauma and local metabolism were important factors. Surgery had a part to play—abscesses must be opened, for example. Systemic treatment had given useful results, but an actinomycotic infection of the neck had relapsed with the primary infecting organism still present although the secondary staphylococcal infection had been eliminated.

Prof. R. V. Christie, FRCP, had treated 104 cases by local application and 13 by systemic administration. In infants it was useful to give penicillin into the bone-marrow of sternum or tibia. Local application had been tried in 34 bone infections with sinuses; all but 3 of the cases were of more than a month's duration. Fourteen were cured, 13 were better and 7 unchanged. Surgical treatment must be combined with penicillin to ensure adequate access to the lesion; presence of a sequestrum did not preclude success but the results were not so good. A variety of soft-tissue infections had been treated, including sycosis barbæ and impetigo. At first he treated only one side of the face in cases of sycosis barbæ of many years' standing, leaving the other as control. The treated side cleared up but relapsed when penicillin was stopped. But by treating both sides of the face, giving if necessary two courses each of about 42,000 units, many cases were cured. It was certain that penicillin was so far the best treatment for this condition. From two lesions which became worse under treatment resistant organisms were cultured. The results in 5 cases of impetigo were very good.

Lieut.-Colonel J. S. Jeffrey, RAMC, who had used penicillin in North Africa, said surgeons must not be upset by the appearance of pus due to gram-negative organisms in wounds treated with penicillin. In all wounds where there was a dead space such pus was to be expected; it did not delay healing and could be dealt with by leaving an opening in the centre of the wound. There was no need to take out sutures because of such gram-negative pus.

Dr. Mary Florey described the good results from treatment of septic hands by surgery combined with local application of penicillin. Over 300 infections had been treated; most were due to staphylococci but the lesions were varied. Including all cases, even those treated while dosage and technique were in the experimental stage, she could report 250 with complete recovery, 41 with improvement, and only 14 without benefit. The infections treated had been present for from 2 months to 32 years before penicillin was used on them. In treating acute infections of the hand a controlled experiment was set up. A hundred septic hands were treated by current technique without penicillin and the results compared with another hundred where penicillin was used in addition to the same measures as in the control group. In the penicillin group organisms disappeared more quickly, and there was also more rapid relief of pain, subsidence of swelling, and disappearance of pus. Healing was more rapid but above all restoration of function in the penicillin group was very much better. In tendon sheath infection the advantage in this respect of the penicillin over the control group was especially striking.

Major Robinson, USAMC, described the usefulness of penicillin in treating sulphonamide-resistant gonorrhœa; 93 cases were cured by a single course of 100,000 units given in doses of 15,000 units intramuscularly every 3 hours. Only 2 men were not cured by such treatment; of these one responded satisfactorily to a second course, the other was the single failure in the series of 95 treated. No toxic effects were seen. Anterior and posterior urethritis, prostatitis, epididymitis—all responded well, although it was worth noting that the one failure had epididymitis. Thirty cases had so far been followed for a month after treatment but no relapse had been seen.

In the general discussion Professor Florey explained that the Oxford unit was a purely arbitrary amount of penicillin which had been originally used for research purposes but was now employed in expressing clinical dosage. He did not feel that attempts to delay absorption would improve clinical results; it was the rapid excretion by the kidneys that made frequent administration necessary.—Major-General L. T. Poole wondered if Colonel Cutler had given gas-gangrene antitoxin to the men in whose wounds he had found clostridia.—Colonel Cutler replied that antitoxin had been given.—Lieut.-Colonel Jeffrey said it was important to give antitoxin as well as penicillin in treating gas gangrene. In necrotic tags of tissue clostridia could persist. Penicillin would be unlikely to reach them but the toxin they formed would be absorbed and required neutralisation. Only antitoxin could do that although the penicillin would prevent spread of the disease.—Dr. Robert Cruickshank agreed that the administration of gas-gangrene antitoxin was important and said it would be most unfortunate if the meeting were to form any different impression.

MANCHESTER MEDICAL SOCIETY

At a meeting of this society held on Oct. 6, Dr. A. Renshaw read a paper on recent advances in the treatment of

Rheumatoid Arthritis

Differences he had noted in the mucosa of the small intestine when examined post mortem had led him to assume in this disease a definite deficiency of secretion from the massive digestive organ, and he claimed to have seen benefit from giving a preparation of erepsin orally to such cases and also to cases of early osteo-arthritis, fibrositis, spondylitis, Still's disease, Paget's disease with rheumatoid arthritis (1 case), and asthma with arthritis (1 case). He described the mode and time of administration of the erepsin preparation, the diet, and the avoidance of ancillary treatment. Of the 200 cases so treated 80·5% showed some improvement, and 60% were able to return to work. Considerable patience, he said, had to be exercised, since relapses occurred on cessation of active treatment, with improvement again on recommencing treatment—as occurred in dealing with a deficiency disease. The lecture was illustrated by slides of post-mortem sections and a film. A brisk discussion followed, and in answer to questions Dr. Renshaw said he had not examined the ereptic activity of the intestinal contents or the fæces in the cases during life.

Reviews of Books

Diseases Affecting the Vulva

(2nd ed.) ELIZABETH HUNT, MD LPOOL. (Kimpton. Pp. 140. 21*s*.)

THIS is an extremely useful book since it coördinates the viewpoint of the gynæcologist and the dermatologist about conditions affecting the vulva. Skin lesions of the vulva are often modified in appearance by conditions peculiar to the site, so that there is difficulty in differentiaing even the most familiar types of skin lesion. Confusion may arise, too, because sensitisation is often localised though the action of the agent causing the reaction is generalised. Thus phenolphthalein, a common constituent of aperients, is cited as causing an acute erythematous rash of the vulva. The special irritability of the vulva to trauma or discharge makes pathological conditions of the skin in this area particularly common. The gynæcological aspects are well represented, and pathological conditions of the vulva are dealt with systematically. Dr. Hunt believes that kraurosis is a late stage of leukoplakia vulvæ or lichen planus, and she deprecates the use of huge doses of ovarian hormone which have been advised for this condition. The book contains details of treatment and numerous prescriptions which will be useful alike to gynæcologists and general practitioners.

Manometric Methods

As applied to the measurement of cell respiration and other processes. (2nd ed.) MALCOLM DIXON, PH D, SC D, FRS. (Cambridge Univ. Press. Pp. 155. 8*s*. 6*d*.)

THE added list, in this second edition, of biological systems which have been studied and of the substances which can be estimated in this way, prove that manometric methods are being applied to an increasing variety of problems. Among the refinements of existing methods developed since the first edition are Dixon's modification of the Dixon-Keilin method of measuring glycolysis in serum. The theory of the Fenn respirometer which is widely used in America has been fully worked out, and manometers of greatly increased sensitivity are described; these so-called ultramicro methods allow the determination of exchanges of gas of the order of 0·001 c.mm. Among those described in some detail are Heatley's microrespirometer and the Cartesian diver ultramicromanometer which was first suggested by Linderstrøm-Lang and worked out by Boell and Needham. A wise balance has been kept between the methods only to be applied by a specialist, and those for everyday use in the laboratory. The attention given to many details which may at first seem trifling will be appreciated by everyone working with these methods: the author, in his wide experience, does not err on the side of over-cautiousness. A set of protocols of actual experiments given at the end of the book illustrates the working of different methods and will be useful to the beginner. Dr. Dixon's book, already indispensable for the research worker using manometric methods, will stimulate many branches of biological and applied research.

Diseases of Infancy and Childhood

(4th ed.) WILFRID SHELDON, MD LOND., FRCP. (Churchill. Pp. 748. 28*s*.)

SINCE the last edition of this sound guide to pædiatrics, the author of its foreword, Sir Frederic Still, has died and Dr. Sheldon pays a tribute to his memory in his new preface. Many of the advances in general medicine find their applications to diseases of children in the revisions and additions in this new edition, and part of a useful series of appendices copes with the sulphanilamide group of drugs and with the proprietary forms of the available vitamins. The chapter on the newborn baby bears testimony to an increased interest in and knowledge of children at this period of life, but the section on tetanus of the newborn omits the doubts that some authorities have cast upon the existence of this malady; tetanus in older children, still a troublesome and dangerous condition, is unfortunately not considered at all. The whole book bears signs of painstaking revision and its standard production, including a good index, shows little evid- of war-time difficulties.

Chemistry and Methods of Enzymes

J. B. SUMNER, professor of biochemistry, Cornell University; G. FRED SOMERS, instructor in biochemistry at the university. (Academic Press. Pp. 365. $5.)

THIS volume is divided into four parts of which part I dealing with the general properties of enzymes is perhaps the most interesting. The second part deals with special enzymes such as esterases, enzymes concerned with carbohydrate metabolism and general metabolic processes. The third is concerned solely with oxidising and reducing enzymes, and the fourth with hydrases and mutases. The chapter on the yellow enzymes is exceptionally good, and the index and references are of the high standard we have learned to expect from American publications.

ANATOMY OF THE FEMALE PELVIS.—In the review of this book on p. 510 of our issue of Oct. 23, we regret that the name of Dr. Smout's coadjutor was inadvertently omitted —F. JACOBY, MD, PH D, lecturer in histology, University of Birmingham, who contributed the sections on the histology of the female reproductive tract and ovarian endocrine function.

New Inventions

SPECTACLE ATTACHMENT FOR GAS-MASKS

Dr. S. W. G. HARGROVE has devised a simple way of attaching spectacle lenses outside the windows of a service or civilian duty respirator, thus obviating the inconvenience of spectacles which become fogged or displaced inside the respirator. A somewhat similar device had been described by J. Bruce Hamilton in Australia (*Med. J. Aust.* 1942, ii, 167).

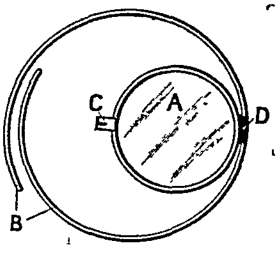

Fig. 1—Attachment ready for insertion. A, lens; B, strong flexible wire; C, side piece; D, solder.

The nose-pads and cross-pieces of the spectacles are removed together with the side members. At the original attachment of the nose-pads, a strip of wire 6–8 in. long is soldered and the wire is bent into a circle around the lenses (fig. 1). This wire should have a cross-section not greater than the cross-section of the thread in the eye-piece of the respirator; so that it will fit into the thread and hold the lenses in position. It should be springy—piano wire does well. The letters L or R should be placed on the lateral attachments of the steel rim surrounding the lenses, so that the lenses can be distinguished when they are removed for cleaning. The attachment is placed in position by compressing the wire circle between the thumb and first finger of the right hand. The inner soldered side of the lenses is first placed in position in the innermost thread of the eye-piece and the remainder of the wire then sprung into the innermost thread. The adjustment of the lenses in the eye-piece of the respirator can best be carried out by using a mirror. The respirator is placed over the face and the attachment is adjusted until the vision is correct. Fig. 2 shows the spectacles in position. The cost of this adaptation is about 6*d*.

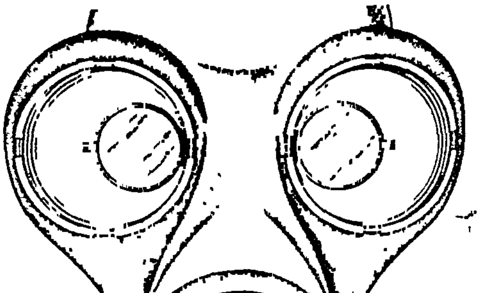

Fig. 2—Service respirator with lenses in position.

With this attachment a man who wears spectacles can apply his respirator as quickly as a man who does not, and if a gas-attack is expected the spectacles can be left attached. There are disadvantages to wearing the lenses in the eye-piece of the respirator. The lenses are a long way from the eye and refraction is inaccurate; this can be overcome by allowing for this distance when the lenses are refracted by the oculist. It is not easy to keep the field of vision constant with a small lens set at a distance from the eye. With high refractive errors a prismatic effect is obtained to a certain extent by inaccuracy in centring the lenses. But from a personal trial Dr. Hargrove finds the advantages outweigh the disadvantages.

THE LANCET

LONDON: SATURDAY, NOVEMBER 20, 1943

MOULDS AND COLDS

WIDESPREAD interest will be aroused by the group of reports at the front of this issue. These show that the beneficent genus *Penicillium* has provided us with another substance of therapeutic promise. From the mould *P. patulinum*, Professor Raistrick and his colleagues have isolated an active principle which they call patulin, and which they have identified chemically. This feat is part of a series of researches of great potential value, but it may have immediate value too. An almost accidental observation by Professor Gye suggested that patulin might be useful in the treatment of the common cold, and the reports include an account of its trial for this purpose by Surgeon Commander Hopkins among naval personnel at Chatham.

The difficulties of such a trial are greater than may appear. A severe streaming cold has objective signs that leave no doubt of the diagnosis, but it may clear up suddenly in the absence of treatment. With a mild cold there may be no objective signs, the course varies, and the time of termination is often hard to determine. We lack any susceptible experimental animal save the inconvenient and expensive chimpanzee. In short, it is extraordinarily difficult to plan exact researches on the cold so as to eliminate psychological factors. Needless to say, the three naval trials were planned carefully with these dangers in mind. Alternate subjects received patulin and an inert fluid which they thought was patulin, sprayed, snuffed up or instilled from a pipette into the nose. In the third trial even those in charge did not know which was the treated and which the control group. The criterion adopted was "recovery within 48 hours," and in each of the three trials there was a strong balance of evidence in favour of the treated group: 44% recoveries against 2·4%, 70% against 10%, and 83% against 22%. An effective remedy for colds would be so welcome that everyone will be tempted to regard these figures as conclusive. But we understand that another investigation elsewhere gave results that were anything but encouraging, and we must await—with what patience we may—the additional evidence needed to demonstrate beyond doubt that patulin combats colds and (if so) how it does it.

One may imagine a "cold cure" to work in one of several ways: for example, it may have pharmacological properties leading to shrinkage of the inflamed mucosa; it may act chemotherapeutically on the causative virus; or it may have a similar action on secondary bacterial invaders. On the whole it seems least likely that patulin acts directly on the cold virus; if it did so, we should hardly read of rapid relief of symptoms only to be followed by recurrence and further relief by more patulin sprays or douches. The evidence of some immediate amelioration of symptoms is strong, but the very rapidity of the effect is a reason for thinking that a pharmacological mechanism must be concerned. No evidence is offered as to whether patulin can act as a vasoconstrictor or in other relatively simple way produce the local relief. Experience with ephedrine and similar remedies suggests that, while symptoms may be relieved, the course of the disease is unaffected. Yet patulin is thought to have shortened the infection in many instances. Is its pharmacological action such an improvement on older remedies that it brings about this desirable end? Or do its bacteriostatic powers come into play to keep secondary invaders at bay? Or has the symptomatic improvement deluded the subjects into thinking that the drug has actually cured them?

Comparison with that other mould product, penicillin, is inevitable. Patulin has one immense advantage, its far greater yield—up to 1 gramme per litre of culture filtrate. But it is toxic compared with penicillin, both against leucocytes and in mice: 0·5 mg. subcutaneously or intravenously will kill a mouse of 20 g. and smaller doses induce local inflammatory reactions under the skin. Patulin is bacteriostatic in vitro, even in the presence of serum and pus. We read that it "is very much less active than is penicillin against gram-positive organisms, but the position is reversed with regard to the coli-typhoid-salmonella group." In fairness to penicillin, it should be pointed out that a comparison is here made between pure patulin and such admittedly impure preparations of penicillin as were available two years ago. In fact patulin had very nearly equal activity against the various bacteria tested, activity of the same order as that recorded for penicillic acid and other mould products: against none was there activity of the order of penicillin's against gonococci. What we still lack is evidence that patulin has antibacterial activity in vivo, and this knowledge is needed to help us to learn how patulin acts and hence what we may reasonably expect it to do. As a result of examining nasopharyngeal swabs of treated and control subjects, Surgeon Commander Hopkins merely records an impression that a distinct reduction of organisms took place.

We are glad to know that patulin "will not be released for general issue pending the completion of further large-scale confirmatory trials."[1] This is especially desirable because the report we publish indicates that the use of patulin, as of other local remedies, may not be free from the risk of favouring the development of sinusitis. It would be a thousand pities for the public to have a cold remedy dangled before its streaming eyes before there is reasonable certainty of its efficacy; and if it succeeds in some cases we must still be prepared for the possibility that it will fail in others. Meanwhile, winter is upon us and its colds should be here in sufficient numbers to permit an early answer as to whether or not patulin will justify our hopes and prayers.

ALEXIS AND TOM

TOM, an American now aged 57, developed an impassable stricture of his œsophagus after swallowing some extremely hot clam chowder 48 years ago. Ever since then he has taken all his food through a gastrostomy opening. For 3 years he has been laboratory assistant to S. Wolf and H. G. Wolff, at the New York Hospital. Their observations on the cuff of mucous membrane round the stoma, the changing appearances of which are strictly parallel with those of the rest of the stomach as seen with a gastroscope, have already been mentioned in our columns.[1] The results, which now appear in book form,[2] are as illuminating as those obtained by William Beaumont[3] in his famous investigations over a century ago on Alexis St. Martin, who had developed a gastric fistula as a result of a gunshot wound of the abdomen. Whereas Beaumont was mainly interested in the chemistry of digestion, Wolf and Wolff have been primarily concerned with the influence of emotions. They found that secretory and motor activity of the stomach is accompanied by increased vascularity of the mucous membrane. When Tom was contented, the mucous membrane was pink, a small quantity of acid gastric juice was constantly secreted, and contractions were weak and rhythmic. During digestion increased secretory and motor activity were accompanied by increased blood-flow, the mucosa becoming redder and thicker. Acute fright and continued depression led to diminution in gastric secretion and pallor of the mucosa. Acute resentment and anger, and continuous anxiety led to hypersecretion, and hypermotility with congestion of the mucous membrane, which became thick, red and turgid, its appearance being exactly like what gastroscopists describe as hypertrophic gastritis. The congested mucosa was very vulnerable, a stroke or tap with a glass rod and slight suction producing a submucous hæmorrhage, which was quickly replaced by a black spot or occasionally by a minute erosion. The latter was at once covered by mucus, and healed within 24 hours. The hæmorrhagic points and black dots often seen with the gastroscope are thus probably the result of injury of the congested mucosa by the instrument, or by the bulb of a Ryle tube introduced a day or two earlier for withdrawing fractions of a test-meal. Spots of bright blood in a test-meal are probably of similar traumatic origin.

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[1] The material for these trials will be supplied by the Therapeutic Research Corporation of Great Britain under the brand name 'Tercinin.'

These observations explain the remarkable differences in the incidence of hypertrophic gastritis recorded by different observers. Whereas some believe that it is extremely common both in civil life and in the Services, and discharge many men with this diagnosis, several experienced gastroscopists regard it as rare in civilians and almost non-existent in the Army. The gastroscopist who completely allays the anxiety of his patient and causes little distress by his examination does not see a thick, red mucosa, whereas one who is less successful in these respects observes it often and comes to the erroneous conclusion that hypertrophic gastritis is common. Doubt had already been thrown on the significance of the condition by the observations of Magnus and Rodgers[4] who failed to discover any anatomical basis for it in specimens obtained by operation and at autopsies, though a recent gastroscopy had shown what they would have hitherto diagnosed as hypertrophic gastritis.

When a patient with a chronic ulcer is suffering from pain, and when an ulcer has just bled or perforated, direct inspection shows that the surrounding mucous membrane is swollen and congested, whereas in quiescent periods it is thin and pale. This has generally been regarded as evidence that an "attack" of ulcer is due to active inflammation, whereas it now seems likely that the congestion is the result of acute resentment or anger, or chronic anxiety. Here we have the explanation why the recurrence of symptoms and the development of hæmorrhage and perforation are so often emotional in origin. A striking example of this was the exceptionally high incidence of perforation during the weeks when London was subjected to constant bombing. Wolf and Wolff found that Tom's erosions developed into ulcers if they were constantly exposed to acid gastric juice by wiping away the mucus which otherwise protected the mucous membrane. An erosion produced by friction of insufficiently chewed food or hard pips and tough skins and fibres on the very vulnerable congested mucosa of an anxious patient is likely to develop into a chronic ulcer in a person with the ulcer diathesis, which manifests itself in a special tendency to hypersecretion and hypermotility and consequently of mucosal congestion.

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[1] *Lancet*, 1943, i, 435.

[2] Wolf, S. and Wolff, H. G. Human Gastric Function, New York, 1943.

[3] Beaumont, W. Experiments and observations on the gastric juice and the physiology of digestion, Plattsburg, 1833.

[4] Magnus, H. A. and Rodgers, H. W. *St. Barts' Hosp. Rep.* 1938, 71, 129.

ORTHOPÆDIC TRENDS

"The glory of children are their fathers," said Solomon. The heritage of the modern orthopædist is a fine one; for their fathers were men of intellect and sincerity, who studied intensely the natural powers inherent in all living flesh. The pace of their work was more leisurely than ours, the diseases and deformities they treated called for no hurry, there was no need to accelerate nature, no need to rush men back into the hurly-burly of war or even into industry. Their wound was a clean one, usually bloodless, rarely septic, and there was none of the mess and mush of immediate accident surgery; the only mess they knew was the plaster mess. They had time to think, and they developed a deep appreciation of the principles of healing, the growth and repair of bone, cartilage, tendon, the mechanism and management of joint and muscle movements. Under the stimulus of necessity their descendants have come to apply this knowledge to a wider sphere—acute traumatic surgery, sepsis, peripheral nerve surgery, the whole field of fracture surgery now comes within the orthopædic domain. But, as Trueta has written, "With the correct philosophical approach comes the right technique."

In his presidential address to the British Orthopædic Association, published in these columns last week, Girdlestone discussed this influence of the orthopædic surgeon on the treatment of fractures. He urges the young orthopædist to cultivate first an intimate acquaintance with the ways and manners of the mesoblast. Between the fractured bone ends there lies not an inert coagulated lymph plug but living cells that demand blood if they are to survive; and strong skeletal traction strangles such cells. The osteoblast needs the stimulus of "push" if it is to thrive—such stress, as Keith[1] puts it, "is as necessary for its health as exercise is for the living body." For the fractured femur Girdlestone thus advises fixed extension on the Thomas splint with skin strapping in the old-fashioned way. Much has been written about the ingenuity of this Thomas splint, and KEITH has pointed out how closely it follows nature's method of splinting. In vertebrates here is a central bony support for the limb, whereas n crustacea and insects there is an ensheathing support. The Thomas splint is the sheath with unnecessary parts cut away; in the "Tobruk" plaster, lately described by BUXTON,[2] plaster is used over the Thomas to complete the encircling sheath. When to move or not to move the difficult joint fracture is always a problem. GIRDLESTONE advises early non-weight-bearing movements; thus in the knee, providing the limb is adequately slung, passive exercises can be started in 4–5 days, and active ones a few days later. For the fractured scaphoid adequate reduction is more important than union; he would place the wrist in full dorsiflexion for three months, observing the greatest gentleness in changing the plasters. He thinks the field for grafting the fractured scaphoid but a small one, seeing that even in practised hands the operation is neither always successful nor devoid of risk of carpal damage. GIRDLESTONE painted rather an alarming picture of the Smith-Petersen pin ploughing its way through the femoral head's vascular system. He suspects the pin of being a potent killer of heads, and pointed out that it takes several years for an avascular head to be recast. The most important part of the treatment of the fractured femoral neck is reduction; after that it can be held by the Thomas splint and Pearson flexion piece with Balkan frame extension, and perseverance with this simple method may well give results comparable to those of the pin.

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[1] Keith, A. Menders of the Maimed, London, 1919.

From his experience and wisdom GIRDLESTONE dded a warning against "attractive" operations—urgical exercises more fittingly done on the cadaver. The warning is timely, for with modern illustration difficult technical procedures are made to appear simple, and the operator (alas, often the patient too) may find that between the seeing and the doing of the thing there is a hideous nightmare. A patient's implicit trust should not be betrayed by such ill-considered adventures. "The surgeon we want for ourselves and our children is one who will not operate if he can attain his purpose by conservative means, and who prefers a safe and simple operation to one which is attractive to perform, though perhaps a little dangerous." GIRDLESTONE elaborated three freedoms in the treatment of the fractured limb—freedom from pain, freedom from pins, where possible, and freedom of the circulation, remembering the need for subsequent expansion. He might have added freedom of the patient from want. As HENRY COHEN has said, "there are no diseases, there are diseased individuals." The interlocking of orthopædics with the ocial services, home conditions, employment and ompensation is now recognised as part of treatment.

The President's address shows that an orthopædic mind, ably endowed, can add much to the teaching of what is really yet the child of most orthopædic services—fractures. But will the orthopædist of the future have the time to think if he is to control, besides the standard orthopædics, accident services (with all their implications), fractures, nerve injuries, rheumatoid arthritis and rehabilitation, and play his part in what is expected to be his greatest contribution, that of positive health? Life is short, a sigh of the wind says the poet. At the end of his years RUBENS lamented, "Just when I begin to know my art I have to die"—and he only painted! A slow evolution of the orthopædists' position and influence is now taking place; fractures are accepted as coming within their department, but their full control of all accident services (the establishment of a traumatic branch) is still for argument. At the Royal Society of Medicine on Nov. 2 PLATT pleaded for a full place for orthopædists in the basic teaching of the undergraduate. How large that place should be will have to be decided in the near future; perhaps if progress is to be safe it should also be slow—as MONTAIGNE says, it is sometimes wise 'to keep water with one oar, with the other grate the shore.' In the meantime it would be well if fracture centres took GIRDLESTONE'S advice and made themselves responsible for instructing the doctors in their districts, teaching especially the principles. If these be understood, the craftsmanship of the technique will readily follow. Of immense worth in this war has been the "disciplining" of hospitals by the regional organisation. Such control is not without its risk, and WATSON-JONES at the BOA meeting indicated the dangers of excess. But with careful selection of the right men there is in fact no such risk. The work of the orthopædic regional advisers in this war has been particularly happy and stimulating.

Annotations

PARLIAMENTARY MEDICAL COMMITTEE

MUCH of the real work of the Houses of Parliament is done without ostentation behind the scenes, and long before the collective voice of medicine was heard in the land there was a little group at St. Stephens conferring how medical issues could best be laid before the legislative assembly. This medical parliamentary group, which includes the medical peers, has made a practice of inviting to its round table one or another non-medical member, such as the late Sir Philip Magnus, whose sympathies were closely identified with medical objectives. More recently some of these elder statesmen have added poise and balance in dealing with wider issues of medicine outside strictly professional matters. With the presentation of the white-paper in sight this would seem to be the appropriate time for widening still further the membership of the group so as to include the various interests which health workers have in common.

"THE LAMP STILL BURNS"

IN producing this film on nursing—in many ways a sound unprejudiced documentary—Mr. Leslie Howard had the help of the Ministry of Health. The clinical details are therefore accurate, though discreet almost to the point of primness. The main interest for the audience lies in deciphering the message of the story—not an easy task, because two distinct propositions are here mated in uneasy union. One is that nursing is a great profession with great rewards; the other that it is grossly marred for many women by unnecessary restrictions on their private lives. Both are true of English nursing today, but in an attempt to do justice to both and offend nobody the film falls into some dangerous trifling with principles. It was a mistake, perhaps, to make the heroine one of the rare women who finds in nursing a true vocation. No question but that such women make matchless nurses, or that they are as stirring to meet as any other man or woman absorbed by an ideal of service; but in our enormous nursing service of today they are

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2. Buxton, St. J. D. *Lancet*, Nov. 6, 1943, p. 564.

naturally relatively scarce. They may leaven the lump, but the bulk of our nursing must be done by girls and women to whom it is merely an interesting occupation comparable with school-teaching or secretarial work. Our nurse in the film is dismissed for a trivial piece of rebellion against rigid etiquette, but is taken back because she agrees to accept without question the restrictions which she has just been condemning, with much cogency, before the hospital committee. There is no suggestion—there is not even a hint—that in this surrender of her principles to her vocation she is in a sense betraying the many girls who do not share her passion for her job. And the determination of her (fabulously rich) admirer to fight for the reforms she wants until, as he says, she can have "both a home and a job" has therefore the colour of a forlorn hope: this is a fight which the nurses must wage themselves, not delegate to friends outside the profession.

The film is partly based on Monica Dickens's frank and pleasing book *One Pair of Feet*, but the grooming process of the studio has turned her hobby into a horse of a different colour. She describes with insight and humour the lies, subterfuges and makeshifts to which nurses are driven by off-duty discipline; and the narrowing effect on a student nurse of even one year in hospital is summed up in the following lines:

> "Through working to routine and never to initiative your brain becomes like a car with a bad pick-up. It ticks over fast enough to cope with what is required of it, but its acceleration deteriorates until it is almost impossible to rev it up sufficiently to keep pace with anyone not similarly affected. One did not notice this in the hospital, where the conversation was unambitious and the humour unsubtle and chiefly lavatorial, but the moment you went among outside people you felt dull and inadequate."

That kind of truth was missing from the film, no doubt because the aim was partly to attract girls to nursing, not to frighten them off. But so much good acting and sensitive production might have been used more worthily on the theme: "The reforms must come first, the nurses will follow." Perhaps if the Ministry of Information had been invoked, as well as the Ministry of Health, that message would now be singing in the ears of our hospital authorities.

BACTERIAL ANEURYSMS

BACTERIAL (or mycotic, to use the old term which should now be given up) aneurysms are scarce; Garland[1] found only 4 in 12,000 necropsies. In reporting 3 new cases, Chamberlain[2] discusses the 19 others recorded since Stengel and Wolferth's[3] review of 217 cases in 1923. For ingenuity no theory of causation has yet surpassed the original one advanced by Ponfick,[4] that such aneurysms are due to an embolus containing a calcified spicule which perforates the wall of the vessel and thus allows bacteria to enter, but the more generally accepted view today is that of Eppinger,[5] that the aneurysm forms as a result of infection of the vessel wall by organisms carried by the embolus. In the case of larger vessels the embolus may lodge in the vasa vasorum, while occasionally the aneurysm may arise from the direct spread of infection along the intima from neighbouring foci. The rarest form of all is probably that which occurs in periarteritis nodosa. Of Chamberlain's 22 cases, 13 were cases of subacute bacterial endocarditis, the remainder representing mainly a mixed bag of septicæmias. Most of these aneurysms are small, measuring a few c.cm. in capacity, though Gage[6] reported one which attained the size of a grapefruit. The commonest causal organism is a streptococcus, as would be expected from the close association with infective endocarditis; other organisms that have been isolated include the gonococcus, *Bacillus typhosus*, *B. anthracis* and *Brucella abortus*. The order of frequency in which vessels were involved was: aorta 8 cases, pulmonary and mesenteric arteries (3 each), radial, common iliac and middle cerebral arteries (2 each), popliteal, posterior tibial, femoral and axillary arteries (1 each). The average age of the patients was 33 and there was a preponderance of males. The time taken for these aneurysms to develop is difficult to assess; Chamberlain believes that, while the septicæmia is present for a few months before the aneurysm is detected, the aneurysm itself only takes a few weeks to attain recognisable size. Once present it develops rapidly, and death usually follows within six months. A bacterial aneurysm is a grave complication, because of the possibility of rupture or vascular obstruction, but 3 cases recovered in this series. Diagnosis is difficult unless a peripheral artery is involved, and Areta[7] tells of one in the radial artery which was incised as an abscess. One in the aorta was detected radiologically on account of calcification in the sac. Those in the mesenteric artery should always be suspected when an acute abdominal emergency occurs in a patient with subacute bacterial endocarditis, or indeed any septicæmia. Treatment obviously depends on that of the preceding bacterial endocarditis, but in this series 2 cases responded to ligation of the aneurysm during a quiescent phase of the endocarditis.

AFTER MENINGITIS

No uniform psychiatric findings have been reported among patients who recover from cerebrospinal fever, and the syndrome described in 1918, as a result of observations on 26 patients at the US Army Hospital at Plattsburg,[8] has been neither confirmed nor refuted by subsequent observers. The symptoms noted then included limitation of flexion of the spine, easy tiring, pains in the back, legs and head, dizziness, faintness, muscular weakness, blurred vision, photophobia, and poor sleep, appetite and nutrition. Dr. M. N. Pai, feeling that the 1940 epidemic afforded an opportunity of settling this question, collected at a neurosis centre a group of 32 patients who had had cerebrospinal fever between 1939 and 1942. In reporting this series to the psychiatric section of the Royal Society of Medicine on Nov. 9, he said that their ages ranged from 18 to 31; and he classed them into three groups, according to whether their previous personality was good (stable people with hobbies, friends and good work records), fairly good (timid and dependent people with fair work records), or neurotic (hysterics, psychopaths, borderline mental defectives, and neurotic people with poor work records). There were 14 cases in group I, 7 in group II and 11 in group III, yet in only 7 cases in all (4 in group I, 1 in group II and 2 in group III) could the neuroses be regarded as the late results of encephalopathy; in the remaining 25 the symptoms appeared to be psychogenic. In the 7 cases thought to be organic the attacks of cerebrospinal fever had been severe and associated with delirium.

The onset of neurotic symptoms (whether organic or functional) followed unusual stress in 2 cases in group I, 3 cases in group II and 7 in group III; similar symptoms had been present before the attack of meningitis in several of the patients in both the last two groups. In all three groups the symptoms included depression, headaches, memory defects and personality changes; but hysterical symptoms were common in groups II and III and rare in group I. In the 7 patients with symptoms attributed to organic lesions the common findings were: mild, persistent depression without self-reproach, frontal headaches, forgetfulness, invalidism and a change of personality towards timidity, restriction of interests and

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1. Garland, H. G. *J. Path. Bact.* 1932, 35, 334.
2. Chamberlain, E. N. *Brit. Heart J.* 1943, 5, 121.
el, A. and Wolferth, C. C. *Arch. intern. Med.* 1923, 31, 526.
Arch. 1873, 58, 528.
, H. *Arch. klin. Chir.* 1887, 35, Suppl. 1.
M. *Amer. J. Surg.* 1934, 24, 667.
7. Areta, T. *Sem. méd., B. Aires*, 1935, 42, 615.
8. Rosanoff, A. J. *J. Amer. med. Ass.* 1918, 71, 1476.

lack of self-confidence. Some degree of intellectual eterioration led to poor learning ability and difficulty in ecalling names, forming new associations, and planning ahead. The 4 organic cases in group I were followed up, and the symptoms have so far persisted. All 32 were Service patients, and 16 of them were invalided out sooner or later; only 3 returned to full duty, and these had all had mild attacks. None of those who had had a severe attack returned to duty. It is noteworthy that the recovery-rate among this group of 32 was not so high as that among other neurotic patients (with no history of meningitis) in the centre at the time.

Dr. Stanley Banks suggested that it would need a longer follow-up to decide whether symptoms were likely to be permanent. Headaches following meningitis often disappear, he said, after about 18 months; the other quelæ might subside in the same way.

OPHTHALMIA NEONATORUM

THE fear that the present upheaval would bring an increase in blindness from ophthalmia neonatorum has fortunately proved illusory. Speaking last week before the section of ophthalmology of the Royal Society of Medicine Prof. Arnold Sorsby said that on the contrary there has been a gratifying decline. The annual returns of the Ministry of Health show that the number of children blinded from ophthalmia neonatorum for the seven years 1934–40 was 44, while there was only one for he two years 1941–42. The incidence of impaired ision has likewise declined, the figures being 190 and 14 for the two periods. As there is no reason to believe that the incidence is substantially lower, it is likely that the improvement today is largely due to sulphonamide therapy.

Blindness from ophthalmia neonatorum has been diminishing steadily throughout the present century. It constituted 18·0% of all causes of blindness in children passed for London County Council blind schools during 1907–13 and had declined to 11·9% in the period 1914–20, as Mr. Bishop Harman showed in 1922 in the Ministry of Health's final report on the Causes and Prevention of Blindness. In 1931 21·1% of children at LCC blind schools were blind from this affection; by 1938 the proportion had fallen to 14·0% and this year it was 9·8%. That ophthalmia neonatorum is nevertheless still to be reckoned with is seen from the fact that at least 15 out of the 127 infants under the age of 5 years at the Sunshine Homes of the National Institute for the Blind were blind from it. In fact, as Mr. Sorsby stressed, though blindness from ophthalmia neonatorum has declined steadily, the decline has not been so steep s for blindness from other infectious disease, and specially from congenital syphilis. An analysis of the distribution of babies with impaired vision and blindness from ophthalmia neonatorum shows that the situation in the LCC area is more satisfactory than in other county council areas and county districts, and distinctly better than in the county boroughs and Wales, though improvement has been evident throughout the country.

There is as yet no standard prophylaxis in ophthalmia neonatorum. Emphasising the paramount importance of adequate antenatal care Mr. Sorsby reported that inquiries addressed to the larger lying-in centres showed that the incidence of gonococcal ophthalmia was no less at centres using silver nitrate than at those using organic silver. In 70,386 births at which silver nitrate was used 64 cases of gonococcal ophthalmia had occurred, while in 39,432 births at which 'Protargol' was used there were 21. On the other hand in Scotland, where silver nitrate is recommended for routine use by the Scottish Central Midwives Board, the incidence of blindness from ophthalmia is distinctly lower than in England Wales (0·23 against 1·25 for 100,000 births during 1934–38). Whatever difference of opinion there may be on prophylaxis, Mr. Sorsby's report on 500 cases of ophthalmia neonatorum treated by him at White Oak since January, 1940, made it clear that in the sulphonamides we have a therapeutic agent which makes blindness or impaired vision from this affection no longer tolerable.

HYPOGLYCÆMIA AND THE HEART

HYPOGLYCÆMIA in its time has been held responsible for many obscure symptoms, principally on account of the relative ease with which blood-sugar estimations can be carried out. Most of these bubbles have been evanescent, so that fresh claims are received cautiously by the experienced. Harrison,[1] however, whose investigations into the biochemical changes in heart-failure are outstanding, now offers a case for a syndrome in which disturbances of cardiovascular function are associated with hypoglycæmia. "Relative hypoglycæmia," he suggests, may be responsible for, or at least play a part in, precipitating various cardiac symptoms. Such attacks never arise less than an hour after a meal, they can often be reproduced by giving insulin, and they can be relieved by glucose. Neither the fasting blood-sugar findings nor the glucose-tolerance curve are characteristic, but there is a tendency for the blood-sugar to be at the lower limits of normality during fasting, and to drop rather suddenly during the glucose-tolerance test to an unusually low level in 2–3 hours. The symptoms characterising the syndrome are nervousness, weakness, palpitations and pain in the chest. The last is usually a vague precordial discomfort not comparable to anginal pain, though in some patients with angina pectoris typical attacks of pain occurring at rest seem to be precipitated by such relative hypoglycæmia. Among associated cardiac disturbances were hypertension, cardiac neurosis, arteriosclerotic heart disease, paroxysmal tachycardia, paroxysmal auricular fibrillation and hypertensive encephalopathy. The condition, according to Harrison, is not rare—it was diagnosed in 31 of the last 204 of his patients with cardiovascular complaints. The treatment is by a diet low in carbohydrate and with a high protein content. Spontaneous hypoglycæmia with loss of consciousness and convulsions is a familiar story; and it is equally well recognised that hypoglycæmia often affects the coronary circulation unfavourably in middle-aged patients. Thus it is a principle in treatment that no middle-aged or elderly diabetic must be allowed to develop hypoglycæmia; the blood-sugar should rather be kept at a relatively high level to avoid the risk of precipitating coronary thrombosis. The syndrome which Harrison describes is much less ostentatious in its manifestations; and it seems to have a threefold significance. It may explain cases where, at present, no precise cause can be found for the cardiac symptoms or signs. In established disease—for example in angina pectoris, hypertension or even paroxysmal dyspnœa—it may explain such exacerbations as pain at rest in patients with angina pectoris or attacks of encephalopathy in patients with hypertension. Finally it may allow us to distinguish one group among the heterogeneous unfortunates labelled "cardiac neuroses." Harrison makes no claim to have proved his thesis, but he has made out a case for investigation.

THE DUKE OF GLOUCESTER has accepted the honorary fellowship of the Royal College of Surgeons of England.

MR. HENRY URMSTON WILLINK, KC, the new Minister of Health, is the son of an architect and son-in-law of Dr. H. Morley Fletcher. He has been special commissioner for the London Region since 1940, which includes the blitz, and is still in his forties.

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[1] Harrison, T. R. and Finks, R. M. *Amer. Heart J.* 1943, 26, 147.

Special Articles

RELIEF IN EUROPE

A MEETING of the English group of the Nutrition Society was held at the London School of Hygiene and Tropical Medicine on Nov. 6 to discuss scientific and medical aspects of postwar European relief.

Lord **HORDER**, who presided, suggested that the United Nations Relief and Rehabilitation Administration (UNRRA), established by the governments and authorities of the united nations to provide adequate relief as soon as the war ends, should be given an opportunity to plan for production so that there will be an adequate supply of materials for aid.

Prof. J. R. **MARRACK**, chairman of the committee for coordination of nutrition surveys, pointed out that inability to import food for direct human consumption from overseas accounted for only a small portion of the deficiency of food in Europe at the end of 1918. The chief reason for the shortage was that the continent produced much less food. This was due to lack of labour, scarcity of fertilisers and the killing off of livestock, as well as the fact that retreating soldiers had stripped the country. Peasants who had left their farms found on their return that the land was covered with grass and young trees. The precarious political and military situation in Europe after the Armistice, he said, made individual states hesitate to trade with each other and this made the general food situation much worse. Food was provided as relief by means of special credits or paid for in cash by the Governments of the countries receiving it. It was distributed through the normal channels of trade in the way that supplies procured by our food controller are distributed in this country at present, or through local authorities. The total amount of food, including relief, imported into European countries, other than those of neutrals and the western Allies, were considerably less during 1919 and 1920 than during 1913, even though food production in these countries was reduced. The total amount of flour and grain (4 million tons) supplied as relief was not enough to make up the deficiency in wheat and rye in Germany alone. Altogether only just over a sixth of the calories were derived from food supplied as relief, and only those children who showed signs of undernutrition were fed under the child feeding programme. Nevertheless at the peak period 3½ million children were being fed. Thus, though the relief supplied appreciably reduced suffering, the amount of food supplied did not provide even sufficient calories, and relief on a large scale ended too soon. Nor was the quality of the food used for relief satisfactory: the greatest deficiency was in animal products, 60% of the relief food was in cereals, and the amount of condensed and evaporated milk sent was small. The foods provided for feeding children also contained too little milk, and no meat. The total food supplied in relief in the five years 1919–24 was less than the sum of imports of wheat and flour, meat, bacon and ham, and sugar into Great Britain during the one year 1918, when our imports of food were cut to a minimum. The amount of pork products was under two-thirds of our imports in that year and one-tenth of the total consumption of pork products in the USA in 1919. In fact only surplus foods, particularly grain and pork products which the USA had been raising in large quantities to meet Allied demands during the war, could be obtained for relief and these goods were sent whether or not they met the physiological needs of the recipients.

Dr. **KARL EVANG**, the Norwegian director-general of public health, pointed out that an outstanding deficiency after the last war was in fat, and it is again seriously deficient in Europe at the moment. Craving for fats, he said, causes violent suffering; and scarcity of food has a grave effect on mental health, underfed people becoming indolent and oppressed by feelings of inferiority. The food situation differs in this war from that in the last war in that we now have a clear appreciation of 3 important nutritional factors:

1. The rôle of vitamins in the development of deficiency disease.

relationship between deficient diet and the development of tuberculosis.

3. The fact that people who have existed for some time on a poor diet are less resistant to disease in general.

A difficulty in assessing the degree of malnutrition is the lack of criteria indicating when an individual passes into the danger period. Hunger œdema is appearing now in Norway: that it is due to lack of proteins in this case seems doubtful because fish is still available in most parts of Norway. He mentioned four important practical principles to bear in mind in feeding Europe after the war:

1. People will want calories first.
2. There is a strong tendency to treat all countries the same, but the standard of nutrition in each country should be taken into account in giving food priorities.
3. The peoples in each occupied country as it is liberated will want to join in the fight and they will not understand if they cannot immediately get enough food to bring them up to fighting strength.
4. Large amounts of fat and protein could quickly be obtained from the sea by mobilising the fishing fleets.

Mr. **GEOFFREY H. BOURNE**, D SC, gave a comparative account of the present food situation in Europe. There is acute starvation and famine in parts of occupied Russia, in Eastern Poland, Croatia and Greece. The rest of Europe is stabilised at a calorie level of about 1000–1500 calories. There is a gross shortage of fat and provision of fat will be the greatest single difficulty after the war. The food deficiencies suggest a serious lack in vitamins A, D and C, riboflavin, and calcium. There are already reports of rickets, scurvy, failure of surgical wounds to heal, fragile bones, anæmia and hunger œdema. The low calorie intake (below the accepted basic level) on which many millions of people in Europe are now existing shows that the body is able to adapt itself to lower calorie levels than has been thought possible.

Mr. **JOHN HAMMOND**, FRS, of the inter-allied technical advisory committee on agriculture, said that the extent of the relief needed would depend on the time available for the enemy to put the scorched earth policy into effect. A minimum amount of food should be given to all countries before any is raised to a higher standard. Meat takes five times as much land as is needed to produce the same number of calories as wheat or potatoes. Therefore in the beginning wheat and potatoes must be given priority in European agriculture. Apart from these two, the greatest amount of food per acre can be obtained from sugar-beet, and rye where there are light acid soils. Tractors, seed and fertilisers will be needed. The chief fertilisers will be phosphate and nitrogen and probably potash. Importation of fertilisers will actually be a saving in shipping space because they will produce 3 times as much food as can be brought in by the same amount of shipping. The greatest deficiency is in animal foods, and it will probably take 8 years to get the production of animal foods back to normal. Attention should first be given to the reconstitution of dairy herds. The milk obtained in this way will be urgently needed to supplement the cereals and potatoes which will make up the greater part of the diet for some time. Slaughter of any female cattle capable of breeding should be prohibited and artificial insemination should be used as widely as possible. Meats and fats should be imported in a form in which they will be easily transported and stored. Oils can probably best be sent as seeds, and the residue from the seeds could be used for animal food, thus helping to increase milk production. Meat should be dehydrated or tinned. Overseas meat-producing countries should now be accumulating reserves of meat prepared in these ways.

Dr. **AUDREY RUSSELL**, member of the Central Council for Refugees, noted that the relief problem today had grown beyond the scope of voluntary bodies. It is important, she believes, to distribute relief in such a way that those receiving it are made self-confident and not treated as helpless people. Refugee camps should accommodate not more than 5000 people in each, and those entering them should be subdivided into groups of 1000 people. There should be mobile and fixed canteens and loud speakers to direct refugees on the road. Refugees travelling back to their own countries should receive rest and attention at transit camps. In the schools of Barcelona during the Spanish war children were graded into three groups according to their nutrition, and given different periods of rest, voluntary activity, and lessons. This is a much better plan than transferring the most debilitated children to camps away from their families; camps are only needed for orphans and strays.

Prof. EDMUND NOBEL, formerly professor of children's diseases at the University of Vienna, described relief work in Austria in the last war and said that staffs of relief feeding kitchens were given a two months training in nutrition. He described Pirquet's method of assessing nutritional requirements in children.

Miss E. M. M. HUME, of the Lister Institute, described the expedition led by Miss Harriette Chick, of which she was a member, to Vienna after the last war. Rickets, scurvy, war œdema and adult rickets were prevalent in Europe. The adult rickets was found to be curable with cod-liver oil, and the expedition was able to solve the problem of the ætiology of infantile rickets.

Dr. A. P. MEIKLEJOHN, of the Oxford Nutrition Survey, said that trained nutritional teams could now go into an area and bring in a relatively good assessment of the average nutritional state in a short time. They had many more aids for this purpose than had expeditions to Europe after the last war.

In summing up the conference the chairman insisted that we must not underestimate the size of the problem which lies before us. He hoped that it would be possible to reduce our own rations a little after the war in order to provide more for our fellows in Europe whose need will be greater.

PHARMACISTS IN THE ARMY

THE Pharmaceutical Society of Great Britain, of which all pharmacists are members, is dissatisfied with the position of pharmacy in the Royal Army Medical Corps. In a memorandum sent to the War Office last year the council of the Society recalled that in August 1918 a RAMC committee recommended that pharmacists of commissioned rank should be employed as inspectors and instructors and that one such officer should be attached to each of the larger bases abroad and to each Command at home. Later a committee formed jointly by the War Office and the Pharmaceutical Society advocated that pharmacists should have charge of dispensaries of hospitals of 100 beds and over, and that a pharmacist commissioned officer, not lower in rank than a captain, should be appointed at the War Office to act in an advisory and inspectorial capacity:

"That the experience of the last war should have confirmed the principle that the medical supply system should be controlled and operated by pharmacists is not surprising since this principle not only governs civilian conditions but is observed generally in foreign armies. . . . What is surprising is the fact that the experience and lessons of the last war should have been so largely ignored by the military authorities."

Though the enlistment of pharmacists, as sergeant dispensers, during the present war has prevented the grave results which attended the employment of non-pharmacists upon dispensing duties in the last war it does not signify a change of attitude.

"When the Army Council agreed to fill war-time vacancies for sergeant-dispensers by pharmacists it was made clear that they were not to be employed as pharmacists but were required only for such duties as were performed by holders of the Army Dispenser's certificate. The decision therefore was not a recognition of pharmacy but a means of obtaining personnel without the necessity of training them."

"Moreover no payment or other advantages are available to pharmacists which are not available to non-pharmacist dispensers. The War Office view in effect always has been and still is that the pharmaceutical requirements of the Army are too simple and stereotyped to provide scope for the practice of pharmacy; that there is no need for the services of pharmacists as such in the RAMC and that for dispensing all that is required is the Army Dispenser's certificate. . . . The approach to the subject is indicated by the classification of dispensing as a 'trade.'"

Dispensing, in the society's opinion, is not work for which non-pharmacists can assume responsibility, though they are capable within limits of acting as assistants to pharmacists and performing certain operations under supervision. Such persons, if employed at all, should not be called dispensers. To the argument that the retention of control in medical hands offsets the disadvantages of the subordinate personnel being non-pharmacists, the society replies that if the pharmaceutical work done by non-medical personnel is carried out or supervised by pharmacists there is no occasion for medical supervision; secondly that medical practitioners do not possess the knowledge which renders them competent to direct policy and supervise pharmaceutical work; and thirdly that in the Army at present the full potentialities of a pharmaceutical service are not and cannot be developed. So that the services of pharmacists may be used to better advantage, the society puts forward various proposals, including:

1. A Directorate of Pharmaceutical Services, with a pharmacist director, should be established at the War Office. It would be concerned with medical supplies, the organisation of pharmaceutical work in the RAMC, the utilisation of new knowledge, the preparation and revision of pharmacopœias and formularies, the pharmaceutical equipment of medical units and the training of all pharmaceutical personnel. Corresponding to this directorate at home there would be subsidiary directorates in the overseas theatres of war.
2. The officer in charge of Command medical stores and his assistants should be pharmacists with commissioned rank. This also applies to mobilisation stores and base stores overseas. In addition to the personnel at the Command medical stores there should be a pharmacist exercising a general oversight of the pharmaceutical affairs of the Command.
3. The pharmaceutical work of each general hospital and the work of the medical stores attached to it should be combined as the "pharmaceutical department" of the hospital, in charge of a pharmacist with as many pharmacist assistants as the size of the hospital makes necessary. These should have commissioned rank. At casualty-clearing hospitals the same principles apply.
4. Each field ambulance has attached to it two sergeant-dispensers who under war-time conditions are generally pharmacists. They are employed largely on general duties, while medical officers spend much of their time upon duties which could be equally well performed by pharmacists. The pharmacists should be given commissioned rank, and should share in the general duties of officers of the unit. They should also be responsible for medical stores and such matters as bandaging and minor dressings, stretcher-drill, passive air defence, camp hygiene, camp reception stations, and adjutant's duties.

"The main point" of the proposals, it is stated, is to ensure "that medical supplies from the time of entering the RAMC until they are used are under the control of pharmacists who have the necessary authority to carry out all those functions which are their special province or for which they can be employed with advantage." The society believes that, given proper recognition and scope for the exercise of their calling pharmacists can make a valuable contribution to the strength and efficiency of the RAMC. It accordingly proposed that a joint committee of the society and the War Office be appointed to work out a comprehensive scheme without delay.

This proposal has been rejected by the War Office. A letter dated March 10 states the Army Council's opinion as follows:

"The arrangements for the provision and supply of drugs, dressings and other medical supplies for the army in all theatres of war under War Office control are in the Council's view entirely satisfactory and after three and a half years of war there has been no breakdown or criticism of these arrangements despite the extremely difficult supply and other conditions encountered. The Council are fully satisfied that the services of pharmacists who are posted to the army as such are utilised in the Royal Army Medical Corps to the fullest advantage in their employment in the duties of the army trade of dispenser. The Council are unable to agree that any changes are necessary in the existing army organisation and therefore regret that they cannot accept the suggestion that a joint committee of the Pharmaceutical Society and the War Office be appointed for the purpose of enquiring into the matter."

This decision is reaffirmed in a letter dated Sept. 18, and permission has been given to publish the correspondence.

ticular constitution craves we may turn an amiable, introspective, hardworking labourer into a bellicose egoist, besides bringing back the smugglers and dope pedlars and opening up further fields for the illicit consumption of morphine and cocaine. The attitude of the Indian Government, following the Royal Commission of 1895, was to emphasise the evils of opium-smoking while justifying the prevalent Indian habit of eating opium, which the commission spoke of as the universal household remedy. But from 1912 onwards, in view of the appalling excess of production of opium and its products over any conceivable legitimate requirements, it has been evident that cultivation of the poppy and the production of raw opium must be reduced. The recent announcement in the House of Commons[8] that it has been decided to adopt the policy of total prohibition of opium-smoking in the British and British-protected territories in the Far East which are now in enemy occupation and not to restore the government monopolies of prepared opium therein is highly gratifying. An ingenuous critic might be led to inquire why this salutary step was not taken while the territories in question were in British possession or under British protection. Indeed the British representative at the Geneva conferences had in his report called attention to the fact "that a very considerable proportion of the revenue of certain of the Crown Colonies is drawn from the traffic in opium for smoking, which is a criminal offence in the self-governing parts of the British Empire and which His Majesty's Government is internally bound to suppress." The reply of the Colonial Secretary also referred to steps to be taken to limit and control the production of opium and promised that the Government will consult with the governments of other countries concerned with a view to securing their effective coöperation in the solution of this problem. This too should gratify America. At last it seems that the fundamental prerequisite for the efficient restriction of opium and its derivatives to legitimate medical and scientific purposes is recognised to be the limitation of opium production.

OTHER PEOPLE'S THUNDER ON THE LEFT

THE Communist Party has produced a memorandum on a national medical service[9] submitted to the late Minister of Health last August. One may hope Mr. Brown studied it carefully, for, while it contains little new, it has picked out from other plans much that is good. Indeed it is a strangely moderate document: with Left and Right rapidly approaching each other, the centre of the road may soon be uncomfortably crowded. The Communists want a whole-time service, but are prepared to start off on a part-time basis. Their major authorities are regional health boards, elected by constituent local authorities; but these are transitional bodies only, pending the creation of multi-purpose directly-elected regional authorities. Health workers come on to the boards as non-voting members. Each board has a regional health-office with six divisions—environmental medicine, epidemiological services, hospitals, health centres, mental health services, and industrial medicine. The present local authorities retain their medical officers of health, but their public health departments are stripped of all clinical functions, though they would still coöperate in epidemiological control. Health centres and divisional health centres (the medical centres or local hospitals of Medical Planning Research) are on familiar lines. An original suggestion is that the first step towards periodical health examinations should be the examination of adolescents before they start work for the first time. It is recognised that much industrial medicine should be done by general practitioners working part-time; so it is suggested that every student should have some training in industrial medicine, while postgraduate facilities should also be widely available. No radical variations from Medical Planning Research proposals are made with regard to hospitals. At the centre there is still the Ministry of Health, balanced on either side by a Central Medical Board to look after wages, appointments, and conditions of service, and an elected Medical Advisory Committee.

CLINICAL TRIALS OF SULPHAMERAZINE

SULPHAMERAZINE, a monomethyl derivative of sulphadiazine whose pharmacology has already been discussed in these columns,[1] is absorbed readily from the alimentary canal but excreted slowly, so that an exceptionally high and persistent blood concentration can be maintained with moderate and fairly infrequent doses, its chief clinical advantage. On a basis of equal blood concentrations, its therapeutic activity and toxicity are closely similar to those of sulphadiazine. The solubilities of sulphamerazine and of its acetyl derivative are greater than those of sulphadiazine and of acetyl sulphadiazine, so that the risk of blockage of the urinary channels ought to be less than with sulphadiazine. Its therapeutic action in cerebrospinal fever and pneumonia has now been studied by Gefter, Flippin and their collaborators[2] in Philadelphia. They treated 45 patients with cerebrospinal fever, 36 of whom were adolescents or adults. An initial dose of 3 g. of sodium sulphamerazine was given intravenously and then 1 g. was given by mouth every four hours until the clinical symptoms had disappeared; the average total dosage was 56 g. during 9·5 days. With children smaller doses were used. The average plasma concentration of sulphamerazine was about 13–16 mg. per 100 c.cm.; but since the compound is unevenly distributed between plasma and red cells, this figure cannot be directly compared with figures for blood concentrations of the other sulphonamides. There were only 3 deaths, giving a case-fatality of 6·7%, 2 of the patients being almost moribund when treatment was started. The case-fatality for cerebrospinal fever in Philadelphia during 1936–42 was about 40–57%, and in a previous series treated with sulphadiazine it was 12·5%. But the fatality varies so much from one epidemic to another that too close a comparison cannot be made between these different figures. With this high dosage toxic symptoms were not uncommon—they occurred in 11 of the 45 patients; 6 had skin rashes, 4 drug fever, and 1 acute loin pain and gross hæmaturia on the 14th day after taking 77 g. of the compound. This last case demonstrates that sulphamerazine may cause blockage of the urinary passages, in the same way as the other sulphonamide compounds do, even though (as in this series) a large fluid intake is maintained. Another report on the use of sulphamerazine in the treatment of meningococcal meningitis is given by Lepper, Sweet and Dowling,[3] who treated 22 cases with sulphamerazine, and 22 alternate cases with sulphadiazine. The dose employed was somewhat higher than that used by Gefter and his colleagues. The therapeutic action of the two compounds was practically identical (case-mortality 9·1% in each series) and so was the toxicity. Three of the 22 patients on sulphamerazine had renal complications, and one of them required cystoscopy.

In a lobar pneumonia series reported by Flippin, Gefter and their colleagues 80 patients were treated with sulphamerazine and 80 with sulphadiazine, alternate patients being assigned to either compound as they were admitted. For this infection the dosage was lower,

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[8] See *Lancet*, Nov. 20, 1943, p. 651.

[9] Central Books Ltd., 2, Parton St., London, W.C.1. 1s.

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[1] *Lancet*, 1943, ii, 296. Welch, A. D., Mattis, P. A., Latven, A. R., Benson, W. M. and Shiels, E. H. *J. Pharmacol.* 1943, 77, 357.

[2] Gefter, W. I., Rose, S. B., Domm, A. H. and Flippin, H. F. *Amer. J. med. Sci.* 1943, 206, 211. Flippin, H. F., Gefter, W. I., Domm, A. H. and Clark, J. H. *Ibid*, p. 216.

[3] Lepper, M. H., Sweet, L. K. and Dowling, H. F. *J. Amer. med. Ass.* 1943, 123, 134.

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[8] See *Lancet*, Nov. 20, 1943, p. 651.
[9] Central Books Ltd., 2, Parton St., London, W.C.1. 1s.

[1] *Lancet*, 1943, ii, 296. Welch, A. D., Mattis, P. A., Latven, A. R., Benson, W. M. and Shiels, E. H. *J. Pharmacol.* 1943, 77, 357.
[2] Gefter, W. I., Rose, S. B., Domm, A. H. and Flippin, H. F. *Amer. J. med. Sci.* 1943, 206, 211. Flippin, H. F., Gefter, W. I., Domm, A. H. and Clark, J. H. *Ibid*, p. 216.
[3] Lepper, M. H., Sweet, L. K. and Dowling, H. F. *J. Amer. med. Ass.* 1943, 123, 134.

Special Article

SOCIAL INSURANCE AND NEUROTIC DISORDER

RECOMMENDATIONS OF RMPA

Sir William Beveridge's proposals on social insurance bear directly on mental health in the coming years Feeling that much will turn on the way they are implemented, the Royal Medico Psychological Association have prepared a memorandum discussing in detail how they might be applied so as to foster a healthy mental outlook, as well as physical well being, in our country The substance of some of their chief recommendations is set out below, with a few words explaining how they were reached

1 An efficient mechanism to re establish the unemployed in industry as soon ost important factor in distress and illness due of unemployment which may be unavoidable and so, of necessity, allowed' or "condoned" by the scheme should be less than the period after which active job hunting leads to a phase of active psychological stress, and should never be long enough for the final apathetic 'broken" stage to develop, studies should be undertaken at a suitable time to determine the usual durations of these periods in England

That the unemployed man goes through such phases has been shown by studies already made At the loss of his job he experiences an initial phase of shock, followed successively by periods of active job hunting, anxiety and apathy During the anxious phase, it seems, he is still capable of being settled in a job, and a satisfactory remedial scheme would not let him go beyond this stage without finding him work In the final apathetic stage he becomes fatalistic, sometimes resentful, and adapts himself within a narrower field

2 With full employment and a comprehensive medical service, the so called unemployable without physical disability will usually be a psychiatric as well as a social problem

Roughly speaking, the less able members of the population are the first to be affected by unemployment—those who are less intelligent, less skilled, or less ready to adjust themselves and persevere Psychiatric disability is likely to be commoner in this group than among those who have been able to fit in with the ordinary demands of life

1. Safeguards against malingering must not be allowed to impair the efficient working of the scheme

Wilful counterfeiting of illness is not found to be a problem, probably because of the immense capacity of the mind to deceive itself Schemes can therefore safely be planned for the benefit of the many rather than to counteract the failings of the few

Work is essential to mental health and the Beveridge report assumes that employment will be maintained, the memo suggests that insurance against loss of work as well as loss of income might be considered as part of the scheme The offer of a training course after six months' unemployment does not meet the case A plan for keeping a pool of employed workers which absorbs immediately all who become unemployed would have a better effect on mental well being Labour could be drawn from this pool as it was needed The choice of work on leaving the pool should initially be made by the applicant after he has been advised on the occupations available, and been told what they entail—that is, he would have some simple vocational guidance. Unpleasant work should carry compensatory advantages Those falling out of employment should be examined to find out the cause, and the information so collected should be analysed

6 A flat benefit rate is a sound principle, but also requires, if it is to further mental health a minimum wage lequately, and no r injured workers , and for the aged years

Fear of not being able to pay the rent is a cause of anxiety and neurosis, and should be eliminated either by full means to cover it, or by some equalisation of rents In dealing with the injured man the memo suggests that we should only consider how badly he has been hurt and what can be done for him, without linking these things to the question of who is to carry the responsibility For accidents due to employer s negligence an injured person can recover damages at common law On psychiatric grounds the memo suggests that the damages which can be collected for any such temporary disability should be restricted, so that the prolongation of temporary illness cannot to the sufferer Thus the would be mainly for treatmen [illegible] than for compensation

7 Earnings extra to the benefits should be permitted, with medical approval and supervision, for any only partly disabled, in order to encourage the most effective rehabilitation—suitable adjusted work

In the interests of both patient and nation any man who can work without harm to his disability (even though entitled to benefits) should be encouraged to do so Workers should therefore be allowed to keep what they earn, and social security payment should not be reduced, the RMPA consider, until the total receipts exceed (say) 66–90% of the usual earnings There would thus be a clear advantage in taking work should be at a higher yment benefit through weakness or badness of character," fail to comply with the conditions for insurance benefit will pass to the care of the National *Assistance Board Such cases, the RMPA feel,* may reasonably be dealt with on the basis of a means test but it is unlikely that different financial treatment will cure the character defect The memo suggests that psychiatry can help here

8 War service disabilities should be dealt with as a special variety of industrial injury

This would avoid disputes about whether the disability was really due to war Any disability occurring in employment involving war risk (e g in the armed forces) or arising out of war risk, whatever the employment at the time, should qualify people for this benefit

9 Old age should be dealt with as a disability (either partial or complete according to the age reached, unless there is overriding medical evidence, and payments, unless based on complete disability, should be uninfluenced by continuance at work

The memo points out that there is no justification other than an actuarial one for treating the elderly differently from those of working age The claims of the aged are comparable to those of the partially or totally permanently disabled, and they should be entitled to a pension equivalent to loss of earning power Retirement should not be the condition required before payments can begin

11 Care of injured workers under the proposed scheme should lessen the tendency to neurosis Abolition of lump sum payments and concentration on the provision of adequate medical care and social rehabilitation are desirable for the same reason Much that is at present dealt with by litigation should be referred to medical tribunals

Many psychoneurotic states are caused or aggravated by the Workmen s Compensation Act The prospects of a lump sum may lead a man to prolong an incapacity and disturb his social life, while failure to receive what he expected may leave him bitter, and his anxiety symptoms are aggravated by worry The proposal in the Beveridge plan that liability should fall on the state, ments should be abolished , permit of the same disturbing form

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THE debate on the Labour amendment to the address showed a House prepared to be conciliatory and constructive and yet ready to be critical of the lack of definition in Government proposals for dealing with the strategy of peace. Now that the Government have declared that the time has now come for definite proposals for postwar legislation to be put forward, the House wishes to see these proposals as soon as possible in the form of bills for discussion. Since the declaration of peace prospects, as one may say, there have been three stages in the Government's presentation of their views Stage one is the general adumbration of an idea, of which Assumption B in the Beveridge report that we need a comprehensive and unified medical service is an example The second stage is the white-paper which serves as a basis for Parliamentary discussion. The *third stage is a bill embodying specific proposals. In* general, apart from education, the House has not yet reached the white paper stage. The white paper on the medical services is still delayed to some time "early next year" and any prospect of a bill is in the indeterminate future, but the Education Bill is to appear

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QUESTION TIME

Reorganisation of Health Services

Replying to questions, Mr. H. **Willink** stated that the white-paper on the reorganisation of health services is in preparation. He must have sufficient time to study closely the many difficult issues involved, and for that reason it was not yet possible for the date of publication to be fixed, but there would be no avoidable delay.

Mr. H. **McNeil**: Do I understand the Minister to inform us [illegible] d that he will not [illegible] ously in draft?— [illegible] eing initiated, but [illegible] first-class importance and of great complexity and great delicacy, and I should not be doing my duty unless I put forward to my colleagues proposals for which I feel I can take the fullest and most real and personal responsibility.—Mr. **Graham White**: Can the Minister give us a little bit of enlightenment as to the period of time? Will it be six months or next year?—Mr. **Willink**: I hope it will be quite early next year.—Mr. G. C. **Hutchinson**: Will this House have an opportunity of debating the white-paper after it has been published?—Mr. **Willink**: Yes, sir.

Major B. E. **Nield** asked the Secretary of State for War if [illegible] if, when the white-paper upon the subject was issued, he would facilitate arrangements whereby their views might be expressed.—Sir **James Grigg** replied: The answer to the first part of the question is no, and to the second part, yes.

Medical Man-power

Sir **Leonard Lyle** asked the Minister of Health if he was aware that owing to the calling up of doctors engaged in practice among civilians, there was increasing difficulty in securing medical attention, especially when Government war [illegible] would arrange for the coöperation of service doctors stationed in the area, but at present relatively unoccupied, to assist in civilian work.—Mr. **Willink** replied: The necessity of supply- [illegible] ments are made to secure that essential medical attention will be available. The [illegible] to give what help [illegible] and in the present [illegible] ments under which their medical officers will give as much help as their essential service duties permit to general practitioners, factory doctors and hospitals in urgent need.

Sir L. **Lyle** asked the Minister whether he would, in consultation with the departments concerned, investigate the possibility of forming a pool of medical men attached to the services in any particular area in this country to ensure that the number was kept at a minimum and their time and experience fully utilised.—Mr. **Willink** replied: A suggestion for pooling medical officers of the Services has already been explored by the Medical Personnel (Priority) Committee. The committee recommended that coöperation between the medical departments of the three Services, already carried out to a considerable extent, should be developed to the highest possible degree, but they felt that complete pooling would not be practicable.

Sir **Ralph Glyn** asked the Minister whether he would consult the medical committees of the London general hospitals as to steps to be taken to meet the most recent requirement of [illegible] what was the proportions of doctors to men in the Services.—Mr. **Willink** replied: My medical officers will be prepared, as always, to consult with, and so far as possible advise, any hospital which is in special difficulty with regard to medical staff. The decision to accelerate the recruitment of a certain number of recently qualified doctors holding house-appointments in hospitals affects far less than half the total of doctors holding such appointments, although in individual hospitals the proportion may be as high as half of the house officers. The house officers are, of course, only a proportion of the medical staff of a hospital and I am advised that the recruitment referred to should not result in depriving civilian patients of essential treatment. The average number of civilians per general practitioner is rather less than 3000 over the country as a whole.

Tuberculosis Allowances

Mr. **Stephen Davies** asked the Minister if he would now, in order to avoid confusion and make it more effective, extend his scheme of allowances to tuberculosis sufferers and their dependants so as to include non-pulmonary and chronic [illegible] less than their own. The association with the war effort which has been the justification in such cases for making repayment from Exchequer funds under emergency powers is not applicable to the other cases referred to in the question, but the fact that certain limitations must on this ground apply to such repayment from the Exchequer does not affect the power of local authorities to grant assistance within the scope of their statutory powers, and I shall be glad to consider in consultation with representatives of local authorities how the objective of ensuring adequate assistance can most effectively be secured.

Control of Voluntary Hospitals

Dr. E. **Summerskill** asked the Minister what measure of control he exercised over the policy of voluntary hospitals, in view of the fact that public money was now used to subsidise wages in these institutions.—Mr. **Willink** replied: I assume that the question relates to the Exchequer assistance available to hospitals in respect of additional expenditure incurred as a result of their adopting the recommendations of the Nurses Salaries Committee. The only condition attaching to the receipt of grant is that the recommendations of the committee shall in fact be observed.

University Grants Committee

Mr. T. E. **Harvey** asked the Chancellor of the Exchequer the nature of the changes made in the University Grants Committee and the names of the present members.—Sir J. **Anderson** replied: I have increased to fifteen the number of members of the committee, in order that their advice to the Government on the important problems that lie ahead may be based on the widest range of experience. Before the war the committee numbered ten, but had been reduced by deaths and resignations to five. Arrangements are being made to hold the first meeting of the new committee at an early date. The following is a list of the members of the committee:

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Tuberculosis in Belgium

In answer to a question, Mr. **Dingle Foot** said that according to his information it was correct that 109,511 supplementary ration books were issued in Belgium in February, 1943, to persons certified to be suffering from tuberculosis.

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new occupation; secondly, a statutory obligation upon employers to accept a quota of disabled from a national register which would be set up; thirdly, the creation of special facilities for the minority who required shel- [illegible] permanent [illegible] designed [illegible] of industry as well as the battlefield.

QUESTION TIME

Reorganisation of Health Services

Replying to questions, Mr. H. WILLINK stated that the white-paper on the reorganisation of health services is in preparation. He must have sufficient time to study closely the many difficult issues involved, and for that reason it was not yet possible for the date of publication to be fixed, but there would be no avoidable delay.

Mr. H. MCNEIL: Do I understand the Minister to inform us [illegible] that he will not [illegible] ously in draft?— [illegible] eing initiated, but [illegible] first-class importance and of great complexity and great delicacy, and I should not be doing my duty unless I put forward to my colleagues proposals for which I feel I can take the fullest and most real and personal responsibility.—Mr. GRAHAM WHITE: Can the Minister give us a little bit of enlightenment as to the period of time? Will it be six months or next year?—Mr. WILLINK: I hope it will be quite early next year.—Mr. G. C. HUTCHINSON: Will this House have an opportunity of debating the white-paper after it has been published?—Mr. WILLINK: Yes, sir.

Major B. E. NIELD asked the Secretary of State for War if [illegible] if, when the white-paper upon the subject was issued, he would facilitate arrangements whereby their views might be expressed.—Sir JAMES GRIGG replied: The answer to the first part of the question is no, and to the second part, yes.

Medical Man-power

Sir LEONARD LYLE asked the Minister of Health if he was aware that owing to the calling up of doctors engaged in practice among civilians, there was increasing difficulty in securing medical attention, especially when Government war [illegible] would arrange for the coöperation of service doctors stationed in the area, but at present relatively unoccupied, to assist in civilian work.—Mr. WILLINK replied: The necessity of supply- [illegible] ments are made to secure that essential medical attention will be available. The [illegible] to give what help [illegible] and in the present [illegible] ments under which their medical officers will give as much help as their essential service duties permit to general practitioners, factory doctors and hospitals in urgent need.

Sir L. LYLE asked the Minister whether he would, in consultation with the departments concerned, investigate the possibility of forming a pool of medical men attached to the services in any particular area in this country to ensure that the number was kept at a minimum and their time and experience fully utilised.—Mr. WILLINK replied: A suggestion for pooling medical officers of the Services has already been explored by the Medical Personnel (Priority) Committee. The committee recommended that coöperation between the medical departments of the three Services, already carried out to a considerable extent, should be developed to the highest possible degree, but they felt that complete pooling would not be practicable.

Sir RALPH GLYN asked the Minister whether he would consult the medical committees of the London general hospitals as to steps to be taken to meet the most recent requirement of [illegible] what was the proportions of doctors to men in the Services.—Mr. WILLINK replied: My medical officers will be prepared, as always, to consult with, and so far as possible advise, any hospital which is in special difficulty with regard to medical staff. The decision to accelerate the recruitment of a certain number of recently qualified doctors holding house-appointments in hospitals affects far less than half the total of doctors holding such appointments, although in individual hospitals the proportion may be as high as half of the house officers. The house officers are, of course, only a proportion of the medical staff of a hospital and I am advised that the recruitment referred to should not result in depriving civilian patients of essential treatment. The average number of civilians per general practitioner is rather less than 3000 over the country as a whole.

Tuberculosis Allowances

Mr. STEPHEN DAVIES asked the Minister if he would now, in order to avoid confusion and make it more effective, extend his scheme of allowances to tuberculosis sufferers and their dependants so as to include non-pulmonary and chronic [illegible] less than their own. The association with the war effort which has been the justification in such cases for making repayment from Exchequer funds under emergency powers is not applicable to the other cases referred to in the question, but the fact that certain limitations must on this ground apply to such repayment from the Exchequer does not affect the power of local authorities to grant assistance within the scope of their statutory powers, and I shall be glad to consider in consultation with representatives of local authorities how the objective of ensuring adequate assistance can most effectively be secured.

Control of Voluntary Hospitals

Dr. E. SUMMERSKILL asked the Minister what measure of control he exercised over the policy of voluntary hospitals, in view of the fact that public money was now used to subsidise wages in these institutions.—Mr. WILLINK replied: I assume that the question relates to the Exchequer assistance available to hospitals in respect of additional expenditure incurred as a result of their adopting the recommendations of the Nurses Salaries Committee. The only condition attaching to the receipt of grant is that the recommendations of the committee shall in fact be observed.

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THE NURSE IN CHARGE

SIR,—Your leading article mentions one of the difficulties in the medical treatment of the junior nurse. Most adults, when they feel the need of advice, can go direct to a doctor. Surely the nurse should be able to do the same, without the intervention of the nurse in charge and the home sister? When the probationer reaches the doctor she may be shy of discussing her affairs before a sister and, as you say, in the absence of a spectacular rise in temperature, she may feel that she is considered to be making an unnecessary fuss. In such an atmosphere it is difficult for the doctor to do his best for the patient.

I believe the junior nurse would be more likely to seek early treatment and to benefit by it, if her contact with the doctor were direct. If she wished, she should be able to take a friend with her and the family doctor relationship should be established as nearly as possible.

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SIR,—The scales published in the second Rushcliffe report have received the approval of the general press and the nursing profession will welcome them as a whole, but there are inconsistencies, particularly in regard to the salaries of ward sisters and women staff nurses. As your annotation of Dec. 11 (p. 740) points out, discrimination in favour of men is very marked, and as before the ward sister comes off poorly. Under the London County Council, the male student nurse, when he becomes state-registered, gets a higher salary in his fourth year of training than the ward sister in her first year, and the staff nurse in her tenth year in that grade (i.e., after fifteen years of service). In the same way, the male charge nurse, who corresponds to the ward sister begins under the LCC at a salary of £300 6s. a year, while the ward sister's maximum only reaches £300 after ten years' service in that grade; and the male assistant nurse after only two years' training starts at a salary of £232 11s. a year, while the ward sister with probably four years' general training, and at least one year's experience as a staff nurse, only begins at £230. Surely the fully qualified woman should receive more than the less highly qualified man. You note that the health visitor receives a higher salary than the district nurse; she also has the advantage over the ward sister. Under the LCC a health visitor receives £300 a year rising to £390 a year compared to the ward sister's £230 rising to £300. [illegible] provinces gets £270 rising to [illegible] that the salary is designed to [illegible] to enter and stay in this branch of work: surely it is equally important to induce suitable persons to become ward sisters.

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Editor.
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SPINA BIFIDA, HYDROCEPHALUS AND OXYCEPHALY

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Obituary

JOHN MICHAEL BARKLA

MB EDIN, FRCSE; FLIGHT-LIEUTENANT RAF

J. Michael Barkla was born in 1915, two years after his father Prof. C. G. Barkla, a Nobel laureate, had left the Wheatstone chair of physics in London to occupy the chair of natural philosophy in Edinburgh. Michael entered Merchiston Castle School in 1925 where he took a prominent part in games and in the musical activities of the school. He was wing three-quarters in the first XV, and [illegible] wards [illegible] the [illegible] But [illegible] hool [illegible] gave [illegible] the [illegible] bed [illegible] country and on the Continent. His university course was a series of successes. In 1938 he was awarded the Ettles scholarship as [illegible] of anatomy under Professor Brash from 1939 to 1941. In the autumn of 1942 Barkla joined the RAF and the following spring he went to North Africa as surgeon with a mobile field hospital. He spent a short time working in the hospital on Lampedusa, but after returning to the neighbourhood of Tunis he lost his life in a motor accident.

Yerbury, Edinburgh

Professor Learmonth writes: "With Michael Barkla's intellectual ability went practical capacity and wise judgment of uncommon degree; and all these gifts he wore with a modesty that was an example to those less fortunate. He gave scrupulous care to every aspect of his work, and gained at once the respect and the confidence of those shrewdest of judges, his patients and his students. When he left to go on service, he had a fine record in the surgery of emergencies, and these practical successes depended as much on his devotion to his patients as on his operative dexterity. He was a gay and stimulating colleague, whose untimely death robs the Edinburgh school of a career that could not but have adorned it, and his associates there of a lovable friend."

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In one *North Western Area* the influenza has appeared in three types The first, the 'official' type, starts suddenly with malaise, headache, generalised pains and pyrexia, within 24 hours the victim is feeling better and in 3 or 4 days is able to return to work, there do not seem to be any unpleasant sequelæ The second starts like the official type, but pyrexia often reaches 103° F and takes several days to settle if the victim tries to get up too soon the pyrexia is liable to recur, this type may last 7–14 days, and is accompanied by a painful and persistent cough due to tracheitis, the patient needs a period of convalescence and may be away from work for 10–20 days The cough tends to be recurrent Elderly patients may have an irregular rapid pulse The third is a true influenzal bronchiolitis with patches of broncho pneumonia This is a severe type and has been responsible for some deaths in young as well as old patients The illness starts as usual but in a day or two râles and crepitations appear at the bases and gradually spread until most of both lungs is involved The radiographic picture is of thickened bronchi with only a few small scattered patches of consolidation The patient becomes severely cyanosed and requires oxygen almost continuously Sulphonamides do not appear to have much effect In fatal cases death occurs from respiratory failure within 7 days In cases that recover, convalescence is slow, cough is persistent and troublesome Patients with previous chronic bronchitis or other lung
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ted by an epidemic which if not to be compared with that of 1918 in severity, probably surpasses it in the number affected Perhaps it is now on the wane, but in 1918 there was a mild onset, a remission in the number of cases, and then an outburst as unexpected as it was severe The present attack has on the whole been mild, and the alarming feature in 1918, of young active folk being struck down with fatal result, has been absent Deaths from influenza and influenzal pneumonia reported for the weeks ending Nov 20, 27, and Dec 4 were 4, 41, 39 but these figures give no idea of the numbers affected, for the disease itself is, of course not notifiable Perhaps this is good in view of paper shortage and for the sake of overworked practitioners who would have to fill in endless forms Factories business concerns and hospitals have been depleted of their staffs A ward has had to be opened to take in sick nurses at more than one big hospital, and of an outpatient clerical staff of 7 only 2 arrived on one day At one big works in the district 1200 workers were absent at a time Doctors have also suffered The most common type has been one with a three day fever, followed by catarrh of the nose and chest Many folk have had to return to work when a rest for convalescence would have been more fitting

Infectious Disease in England and Wales

WEEK ENDED DEC 4

Notifications —The following cases of infectious disease were notified during the week smallpox 0, scarlet fever, 2694, whooping cough, 1757, diphtheria, 610, paratyphoid, 2, typhoid, 8, measles (excluding rubella), 151, pneumonia (primary or influenzal), 2291 (last week 1061), puerperal pyrexia, 136, cerebrospinal fever, 60, poliomyelitis, 4, polio encephalitis, 1, encephalitis lethargica 3 dysentery 111 [illegible]

The figures in parentheses are those for London itself

Exeter reported the fatal case of enteric fever Besides 57 deaths from influenza Birmingham had 5 from diarrhœa, 3 from whooping cough and 3 from diphtheria

The number of stillbirths notified during the week was 169 (corresponding to a rate of 29 per thousand total births), including 23 in London

Births, Marriages and Deaths

BIRTHS

AUBERT —On Dec 7 at Nottingham the wife of Dr Edward Aubert—a daughter

FAWDRY —On Dec 5 at Nicosia, Cyprus, the wife of Dr Alan Fawdry—a daughter

HOWARD —On Dec 4 in Norwich the wife of Flight Lieutenant Richard Howard FRCSE RAF—a daughter

LODGE —On Dec 4 at Oxford the wife of Surgeon Lieutenant F F Lodge RNVR—a son

O DONOVAN —On Dec 6 in Dublin the wife of Dr D K O Donovan —a daughter

PRUNTY —On Dec 8 at Hindhead the wife of Dr Garnet Prunty —a son

SMALLSHAW —On Dec 9 at Epsom Downs the wife of Dr D B Smallshaw—a daughter

MARRIAGES

BENNETT—ALDRED —On Dec 4 at Wroxham Ronald Campbell Bennett MB to Barbara Aldred

LONGMORE—CENTLIVRES —On Nov 10 at Cape Town, John Bell Longmore, BM surgeon lieutenant RNVR, to Virginia Centlivres

DEATHS

GIBSON —On Dec 4, at Ealing Francis Maitland Gibson BSC MB EDIN formerly director of the King Institute of Preventive Medicine Madras aged 80

GOSSAGE —On Dec 10 at Chertsey William Herbert Gossage MRCS aged [illegible]7

HITCHINGS —On Dec 8 at Oxford Robert Hitchings MRCS

JACKSON —On Dec 6 at Boscombe Hants William Massingberd Middleton Jackson, MD DURH DPH, late RAMC, formerly of Folkestone, aged [illegible]8

KNEVITT —On Dec 9 Herbert Knevitt MRCS, of Ealing Green aged 76

LAUDER —On Dec [illegible] at Southbourne Bournemouth Thomas Campion Lauder, MB EDIN LRCPI DPH DTM lieut-colonel RAMC retd.

SHARROD —On Dec. 9 Arthur Richard Sharrod MB LOND of Stourbridge aged [illegible]6

WILSON —On Dec 1, Roger Parker Wilson CH, FRCS lieut colonel IMS retd

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ted by an epidemic which if not to be compared with that of 1918 in severity, probably surpasses it in the number affected Perhaps it is now on the wane, but in 1918 there was a mild onset, a remission in the number of cases, and then an outburst as unexpected as it was severe The present attack has on the whole been mild, and the alarming feature in 1918, of young active folk being struck down with fatal result, has been absent Deaths from influenza and influenzal pneumonia reported for the weeks ending Nov 20, 27, and Dec 4 were 4, 41, 39 but these figures give no idea of the numbers affected, for the disease itself is, of course not notifiable Perhaps this is good in view of paper shortage and for the sake of overworked practitioners who would have to fill in endless forms Factories business concerns and hospitals have been depleted of their staffs A ward has had to be opened to take in sick nurses at more than one big hospital, and of an outpatient clerical staff of 7 only 2 arrived on one day At one big works in the district 1200 workers were absent at a time Doctors have also suffered The most common type has been one with a three day fever, followed by catarrh of the nose and chest Many folk have had to return to work when a rest for convalescence would have been more fitting

Infectious Disease in England and Wales

WEEK ENDED DEC 4

Notifications —The following cases of infectious disease were notified during the week smallpox 0, scarlet fever, 2694, whooping cough, 1757, diphtheria, 610, paratyphoid, 2, typhoid, 8, measles (excluding rubella), 151, pneumonia (primary or influenzal), 2291 (last week 1661), puerperal pyrexia, 136, cerebrospinal fever, 60, poliomyelitis, 4, polio encephalitis, 1, encephalitis lethargica 3 dysentery 111

the figures in parentheses are those for London itself

Exeter reported the fatal case of enteric fever Besides 57 deaths from influenza Birmingham had 5 from diarrhœa, 3 from whooping cough and 3 from diphtheria

The number of stillbirths notified during the week was 169 (corresponding to a rate of 29 per thousand total births), including 23 in London

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Births, Marriages and Deaths

BIRTHS

AUBERT —On Dec 7 at Nottingham the wife of Dr Edward Aubert—a daughter

FAWDRY —On Dec 5 at Nicosia, Cyprus, the wife of Dr Alan Fawdry—a daughter

HOWARD —On Dec 4 in Norwich the wife of Flight Lieutenant Richard Howard FRCSE RAF—a daughter

LODGE —On Dec 4 at Oxford the wife of Surgeon Lieutenant F T Lodge RNVR—a son

O DONOVAN —On Dec 6 in Dublin the wife of Dr D K O Donovan —a daughter

PRUNTY —On Dec 8 at Hindhead the wife of Dr Garnet Prunty —a son

SMALLSHAW —On Dec 9 at Epsom Downs the wife of Dr D B Smallshaw—a daughter

MARRIAGES

BENNETT—ALDRED —On Dec 4 at Wroxham Ronald Campbell Bennett MB to Barbara Aldred

LONGMORE—CENTLIVRES —On Nov 10 at Cape Town, John Bell Longmore, BM surgeon lieutenant RNVR, to Virginia Centlivres

DEATHS

GIBSON —On Dec 4, at Ealing Francis Maitland Gibson BSC MB EDIN formerly director of the King Institute of Preventive Medicine Madras aged 80

GOSSAGE —On Dec 10 at Chertsey William Herbert Gossage MRCS aged [illegible]7

HITCHINGS —On Dec 8 at Oxford Robert Hitchings MRCS

JACKSON —On Dec 6 at Boscombe Hants William Massingberd Middleton Jackson, MD DURH DPH, late RAMC, formerly of Folkestone, aged [illegible]8

KNEVITT —On Dec 9 Herbert Knevitt MRCS, of Ealing Green aged 76

LAUDER —On Dec [illegible] at Southbourne Bournemouth Thomas Campion Lauder, MB EDIN LRCP DPH DTM lieut-colonel RAMC retd.

SHARROD —On Dec. 9 Arthur Richard Sharrod MB LOND of Stourbridge aged [illegible]6

WILSON —On Dec 1. Roger Parker Wilson CB, FRCS lieut colonel IMS retd

ANXIETY NEUROSIS IN COMBATANTS

C. P. SYMONDS, DM OXF'D, FRCP

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Those who support this hypothesis generally assume that the sufferer is himself unaware of the nature of the conflict.

Curran and Guttmann (1942) say: "The sufferers (from anxiety states) are usually unaware of the nature of their conflicts or at least do not face them openly," though in a [illegible] to emphasise the correlation with a specified psychopathology, define a psychoneurosis as implying "either bodily disturbance . . . dependent in a way unknown to the patient on mental causes; or a mental disturbance not the result of bodily disease . . . which the patient realises to be abnormal and the meaning of which he is at a loss to understand." The nature of the affective disturbance resulting from this conflict is variously defined. Curran and Guttmann (1942) regard it "as a condition of fear not clearly focused on any special object"; James (1940) as an emotional state closely allied to fear; Henderson and Gillespie (1940) as "a state of morbid fear."

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Thus Mapother (1935) stated that the anxiety neurosis of war "was an over-excitability of the fear mechanism and was constitutional, or the result of stress of special duration or severity, perpetuated by situations which had become conditioned stimuli in the particular individual." In his evidence before the Shell-Shock Committee (Mapother 1922) he had expressed a similar opinion with regard to shell-shock, stating that it was "due to mental strain or shock too prolonged or too intense for the particular individual to endure without the emotion becoming persistent. In some cases the strain or shock was quite inadequate to cause the resulting symptoms in a normal man, but was adequate for that individual on account of constitutional predisposition or acquired predisposition due to bodily causes such as infection."

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and headache. This was the commonest form of "shell shock" the symptoms of which constitute the basic feature of all forms of the neuroses of war."

THE RÔLE OF CONFLICT

There is then some warrant for the belief that an anxiety neurosis may develop as a direct result of over-stimulation of the fear mechanism, that this is a common occurrence in war, rare in civil life, and that emotional conflict is not essential for the causation of an anxiety neurosis whether in civil life or war any more than it is essential for the causation of other kinds of affective disorder, for example, depression. These views are by no means incompatible with the supposition that emotional conflict may be an important or common cause of neurosis, either alone or as a factor complicating other causes.

We are all aware from introspective experience that conflict between opposing emotions has an unpleasant affective quality of its own. The quality is difficult to describe. It is a feeling of tension, uneasiness or insecurity which is distinct from other affective states though it most nearly resembles fear. It is recognised as a natural part of the reaction to a situation or idea which evokes opposing emotions and though it is an unpleasant feeling it is up to a point beneficial in sharpening judgment. This variety of affect is generally called anxiety. It lasts normally as long as the emotional conflict exists. As a rule the conflict is resolved by some action or decision taken by the individual whereby one set of emotions is further excited and the other set inhibited. The affective state of anxiety then disappears. There are many normal situations however in which emotional conflict is continuous over long periods and anxiety in lesser or greater degree also continues. We may speak therefore of chronic anxiety as well as acute anxiety, using the word anxiety here in a specific and restricted sense meaning the affective state engendered by emotional conflict, and may regard acute or chronic anxiety as normal so long as the circumstances when fully known appear to justify its existence. We must also be prepared to admit considerable individual variation in the readiness with which anxiety is aroused, its intensity and its persistence, these variations depending as in the case of other types of affective response both on heredity and experience. If the emotional conflict is sufficiently intense or prolonged, or if individual sensitiveness in respect of anxiety is greater than the average, and especially if both factors operate together, a morbid state of anxiety may develop which as in the case of other affective disorder once it gets beyond a certain point will persist, despite the absence of adequate cause. That such morbid states occur is well recognised in clinical psychiatry, and they are at present generally included under the heading of anxiety states. They have been described also as states of agitation or tension. It is as reasonable to suppose that intense though normal anxiety of the kind that arises from emotional conflict may give rise to morbid anxiety as that intense sorrow may give rise to morbid depression, or intense fear to a morbid state of fear.

CONFLICT NEUROSIS AND FEAR NEUROSIS

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Of the two neuroses into which we have thus subdivided the anxiety neurosis the conflict neurosis is by far the commoner in civil life because occasions for emotional conflict are common and occasions of intense or prolonged fear are rare. Moreover one of the commonest emotional conflicts under conditions of peace is that between sexual and other emotions. Hence when psychical factors are a cause of conflict neurosis frustrated sexual desire is quite commonly found in the background. Herein probably lies the foundation of Freud's original conception of the anxiety neurosis as resulting from frustration of the libido. Under conditions of war not only is the fear neurosis much commoner than in peace, but the conflict neurosis, which is equally common, is usually derived from a conflict between fear and other emotions, instead of sex and other emotions.

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[illegible] of the affects of fear and conflict and out of this may arise various combinations. Normal fear versus other emotions may lead to a conflict neurosis in which, so long as the dangerous situation persists, the affect of fear is also present. A fear neurosis so long as other and opposite emotions are present to contend with it will be attended by the affect of conflict, or fear neurosis and conflict neurosis may coexist, both affective states existing or persisting in circumstances which do not justify their existence. Such distinctions may appear somewhat academic, for in practice it is often extremely difficult in the analysis of a mixed state of fear and conflict to decide whether one or the other or both are morbid as opposed to natural. I believe, however that the distinction which I have supposed to exist between the affective states of fear and conflict deserves emphasis for it provides an explanation of a divergence of opinion as to the nature and causation of the anxiety neuroses of war which has been responsible for a good deal of confusion. For this reason, if for no other, fear neurosis and conflict neurosis might well be employed to supplant the term anxiety neurosis, which like other psychiatric labels in the past has acquired so many different connotations that it has become a hindrance rather than a help to clear thinking.

DEVELOPMENT OF WAR NEUROSIS

Making use of the distinction and the terms which have been suggested, I shall now trace in outline the development and symptoms of the common type of war neurosis. It is necessary in the first place to [illegible] that fear is a state which is natural, especially in such circumstances of extreme, continued or repeated [illegible] as ex[illegible] howev[illegible] upon [illegible] stimul[illegible] of the [illegible] acquired as the result of conditioning and experience. Such sensitiveness whether innate or acquired may be specific for certain kinds of danger. The affective state of conflict when fear exists is equally natural under most circumstances, for danger in war as a rule excites affects other than fear—rage, sense of duty to others and one's own reputation. If th[illegible] inhibit f[illegible] the appearance of fear or if fear inhibits the [illegible] set of affective stimuli, there is no conflict, but and headache [illegible] This was the commonest form of 'shell shock' the symptoms of which constitute the basic feature of all forms of the neuroses of war."

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SUMMARY

Anxiety neurosis in flying personnel and in troops in the battle zone generally arises from fear. There are *two different views of the process by which the neurosis* develops. One supposes that there is a conflict between fear and other emotions, of which the sufferer is generally unconscious, and that the affective disturbance results from frustrated instinctive desire. Another view is that over-stimulation of the fear mechanism can result in a persistent and morbid state of fear. The arguments for and against each of these hypotheses are reviewed.

It is suggested that the anxiety neurosis of war includes two kinds of affective disorder. The dominant affect in one is fear and in the other a state of tension associated with emotional conflict. Either affective disorder may occur alone though generally they occur together.

The distinction between [illegible] mal [illegible] and [illegible] ion [illegible]

The importance as a criterion of anxiety neurosis of unawareness in the individual of the nature and causes of the affective disorder from which he suffers is discussed and it is concluded that lack of awareness is not an essential feature of the neurosis, though it may in certain respects influence its pattern and prognosis.

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CLINICAL STUDY OF AN OUTBREAK OF INFLUENZA B

DURING THE WINTER, 1942–43

J. M. Stansfeld
M B CAMB
CAPTAIN RAMC

C. H. Stuart-Harris
M D LOND, M R C P
MAJOR RAMC

(*From a military laboratory*)

BETWEEN November, 1942, and the end of February, 1943, an epidemic of influenza B was investigated in certain military units. This paper records the clinical data (see also Stuart-Harris, Glover and Mills 1943).

In one of the units notes were made on 42 cases, 31 of which were studied by one of us (J. M. S.), 7 by Lieut. A. B. Kinnier Wilson, RAMC, and 4 by Major T. M. A. Lewis, RAMC. [illegible] admitted to camp reception [illegible] respiratory infections, altho[illegible] to be cases typical of influen[illegible] Major R. S. Muckenfuss, USAMC, records of 25 patients admitted to the 1st Medical General Laboratory of the US Army, and suffering from influenza-like illnesses, were also available.

First serum tests were made on both acute and convalescent sera of all these patients and according to the rise of antibody to influenza B they may be placed in three categories:—

1. *Significant rise of antibody (4-fold or greater)*
   - 24 from reception stations } Influenza B.
   - 11 from American hospital }
2. *No rise of antibody*
   - 14 from reception stations { 3 diagnosed clinically as atypical pneumonia.
   - 12 from American hospital { 23 influenza Y (undetermined ætiology).
3. *Doubtful rise of antibody (2–3 fold)*
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   - 2 from American hospital }

Sera from all cases in categories 2 and 3, and from 6 cases in category 1 were also tested against virus A, but no significant rise in antibodies was detected. The term influenza Y (Rickard et al. 1941) was given as a matter of convenience to the group of cases of clinical influenza whose ætiology remained undetermined by the serological methods employed.

The symptoms of the camp reception station cases were recorded in sufficient detail for comparison of influenza B and Y groups with each other and with 60 collected cases of influenza A (Stuart-Harris 1941). The table indicates that the three groups differed little clinically. This agrees with the opinions of the clinical observers, who could not differentiate between them.

SYMPTOMS AND SIGNS COMPARED

—	1942–43		1937–41
	Influenza B (24 cases)	Influenza Y (12 cases)	Influenza A (60 cases)
ONSET (%)			
Sudden	78	100	75
Premonitory symptoms	30	0	18
SYMPTOMS (%)			
(*a*) *Constitutional*—			
Sweating	91	58	17
Headache	83	100	85
Shivering	82	83	80
Malaise	80	100	87
Anorexia	79	91	71
Muscular pains	75	66	60
Giddiness	58	55	32
Nausea or vomiting	29	33	17
Photophobia	14	8	20
Insomnia	12	0	38
Fainting	7	0	5
(*b*) *Respiratory*—			
Cough	92	58	88
Coryza or nasal obstruction	66	58	50
Sore throat	42	50	48
Substernal chest pain	33	17	11
Sputum	24	54	31
Hoarse voice	12	8	10
Other chest pain	0	19	0
Epistaxis	0	0	8
FEVER			
Average length	3 days	1·85 days	3 days
Secondary rise (diphasic curve)	46%	0%	21%
Average maximum temperature	100·8° F.	102·5° F.	101·2° F.
ABNORMAL SIGNS IN CHEST	18%	33%	35%

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In contrast to the previous season when no significant rise in antibody was detected by the Hirst test, differences in titre between acute and convalescent sera were noted. From the middle of December, 1942, until the middle of February, 1943, a proportion of the cases upon which serum tests were made showed an increase in antibody to influenza virus B, but not to influenza A.

The entire series of tests in 1942–43 were made with reconstituted dried allantoic fluid kindly made available by Dr G. K. Hirst of the International Health Division of the Rockefeller Foundation, New York. Early in 1943 Hirst's new technique (1942) was adopted using 0·5 c cm quantities of serum and virus and red cell standards from 0·25% to 0·87%. The period of sedimentation was increased from 60 to 75 minutes. As many different batches of fowl red cells as possible were employed during the tests in order to minimise *in the final results, the influence of individual fowl cells* which had been found to have an effect on the actual inhibitory power of a serum against virus B but not against virus A. The simultaneous test of the two sera from each patient with the same reagents also reduced variation in the results from technical causes.

In each test standard sera were used—namely, a hyperimmune rabbit serum for B tests and two pools of human sera (1941) *for A tests. In 22 out of 25 tests of the B serum* against the homologous virus the readings were between 1/128 and 1/256; the other 3 were 1/64, 1/96 and 1/320. *The 14 tests of the* human pool sera versus A ranged from 1/64 to 1/160.

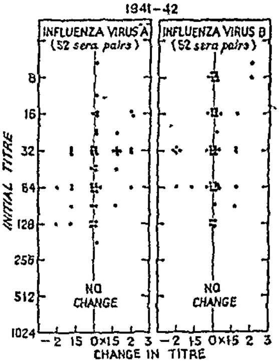


Fig. 1

Fig. 1 shows the results of the Hirst test on 52 pairs of sera from 1941–42, *difference of titre of* the two members of each pair being plotted against the titre of the first serum collected during the fever. Most of the pairs of sera showed no change in titre with either virus A or B; a few showed a decrease, and a few an increase in titre not exceeding 2-fold, against either virus. Hirst has stated that a 4-fold increase *indicates influenza virus infection*, so *the results with these* sera were, by his standards, negative.

Fig. 2 shows the results, similarly plotted, of tests with virus B on 114 sera from *1942–43, 78 of which were also* tested against virus A. Of these 114, 52 showed either no change, a decrease in titre, or an increase not exceeding 1½-fold, 12 showed a 2-fold *or 3 fold* increase, and 50 showed an increase 4 fold or greater. The sera of all 52 in the first category, of 11 in the second category, and 15 which exhibited 4-fold or greater increases to virus B, were tested against virus A. Only 2 pairs of sera exhibited differences in titre with virus A *in excess of* three times—namely, 4-fold and 5-fold increases; the majority [illegible] the sera which were placed in [illegible] tests against virus B showed no [illegible] virus A. These results were interpreted as indicating infection with influenza *virus B in 50 patients.*

Fig. 2 also shows that the rise of B antibodies in individual patients was correlated with the initial titre of the *serum, so that patients* with low initial levels of antibody (8–32) more often showed increases in antibody than did those with high initial levels (128–512).

For 16 pairs of sera the results of the *Hirst test were checked* by neutralisation tests in mice, the sera included specimens in which the rise was considerable and others in which it was small. The results were plotted *graphically as by Hirst* (1942). Correlation was good, though not quite so close as in Hirst's results with influenza A virus; this is doubtless largely accounted for by the variable introduced *into the* tests with B virus by the unavoidable use of cells from different fowls.

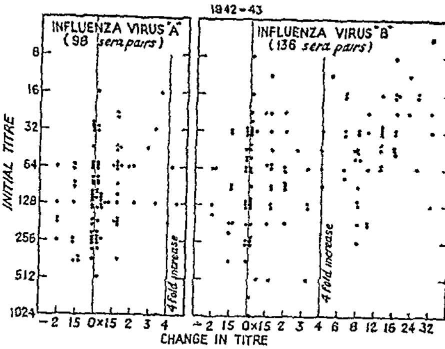


Fig 2

Towards the end of the normal influenza season and after it, there were a number of small outbreaks apparently due to influenza A. Two of three sporadic cases of influenza arising towards the end of March in a single unit of division B showed increases of antibody to influenza A but not to B. This unit was disbanded five days later, so further observations were impossible. From a localised outbreak in East Anglia in March, 1943, ten sera were examined—2 pairs (*acute and convalescent*) and 6 single (convalescent) specimens. The paired sera showed in one case a definite (×8), in the *other a doubtfully significant rise of titre against A, but* none against B; one of the single specimens showed so high an anti-A titre (1/512) as to suggest a recent A infection. From an outbreak on an R.A.F. station, also in East Anglia, in May, 1943, 7 pairs of sera were obtained; none showed any rise against B but 4 showed a rise against virus A (×6 to ×16). Finally pairs of sera from a local outbreak in Scotland in June, 1943, showed in 4 instances a significant rise and in 2 a trivial (×2 to ×3) rise against virus A; again there was no evidence of B infection.

Attempts were made to recover, by means of egg inoculations, strains of influenza virus from the garglings of patients who did, or did not, show increases in B antibody as a result of their infection. Garglings were not available from the *cases of* influenza A, but those from 21 cases were tested, of which 11 were *from patients diagnosed as influenza B on serological* grounds. The garglings were filtered and inoculated amniotically into 12 day chick embryos, and passage *from chick to chick was carried out 1–14 (usually 3) times.* No virus was recovered by this procedure; the extra-embryonic fluids of the inoculated eggs never acquired the power to agglutinate fowl red cells, nor did they (11 samples) produce lesions in mouse lungs, even on passage, or (6 samples) infect ferrets.

Ferrets.—Garglings from 26 patients were inoculated into ferrets between January and April, 1943. Of these, 7 came from the military units mentioned above, 2 from the Eastern counties and the rest from the London area: if circumstances did not permit immediate inoculation they were stored in CO_2 alcohol at –78° C. for a few days.

The garglings were administered intranasally to ferrets in the usual manner under ether anæsthesia. The results were at first sight completely negative since no recognisable clinical symptoms with typical fever were detected. As the number of ferrets was insufficient to permit "blind" serial passages as carried out in previous years, we decided to apply the Hirst test to the sera of "convalescent" ferrets to determine whether antibodies against either A or B virus had developed.

The general plan was to inoculate two ferrets with the *original material. One of the pair was killed at the 4th or* 5th day and a centrifuged suspension of lung and turb[illegible] in 10% serum broth was frozen in CO_2 alcohol. The *ferret was bled about 14 days after inoculation and th*

In contrast to the previous season when no significant rise in antibody was detected by the Hirst test, differences in titre between acute and convalescent sera were noted. From the middle of December, 1942, until the middle of February, 1943, a proportion of the cases upon which serum tests were made showed an increase in antibody to influenza virus B, but not to influenza A.

The entire series of tests in 1942–43 were made with reconstituted dried allantoic fluid kindly made available by Dr G. K. Hirst of the International Health Division of the Rockefeller Foundation, New York Early in 1943 Hirst's new technique (1942) was adopted using 0 5 c cm quantities of serum and virus and red cell standards from 0 25% to 0 87% The period of sedimentation was increased from 60 to 75 minutes. As many different batches of fowl red cells as possible were employed during the *tests in order to minimise* in the final results, the influence of individual fowl cells which had been found to have an effect on the actual inhibitory power of a serum *against* virus B but not against virus A The simultaneous test of the two sera from each patient with the same reagents also reduced variation in the results from technical causes

In each test standard sera were used—namely, a hyperimmune rabbit serum for B tests and two pools of human sera (1941) for A tests In 22 out of 25 tests of the B serum against the homologous virus the readings were between 1/128 *and* 1/256 *the other 3 were* 1/64, 1/96 and 1/320. The 14 tests of the human pool sera versus A ranged from 1/64 to 1/160

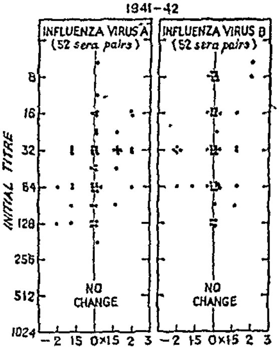


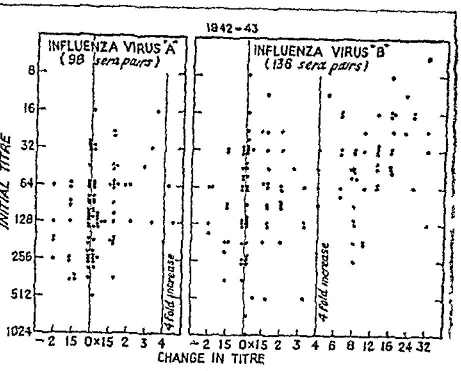
Fig. 1

Fig. 1 shows the results of the Hirst test on 52 pairs of sera from 1941–42, difference of titre of the two members of each pair being plotted against the titre of the first serum collected during the fever. Most of the pairs of sera showed no change in titre with either virus A or B; a few showed a decrease, and a few an increase in titre not exceeding 2-fold, against either virus Hirst has stated that a 4-fold increase indicates influenza virus infection, so the results with these sera were, by his standards, negative.

Fig. 2 shows the results, similarly plotted, of tests with virus B on 114 sera from 1942–43, 78 of which were also tested against virus A Of these 114, 52 showed either no change, a decrease in *titre*, or an *increase not exceeding* 1½-fold, 12 showed a 2-fold or 3 fold increase, and 50 showed an increase 4 fold or greater The sera of all 52 in the first category, of 11 in the second category, and 15 which exhibited 4-fold or greater increases to virus B, were tested against virus A Only 2 pairs of sera exhibited differences in titre with virus A in excess of three times—namely, 4-fold and 5-fold increases; the majority [illegible] the sera which were placed in [illegible] tests against virus B showed no [illegible] virus A These results were interpreted as indicating infection with influenza virus B in 50 patients.

Fig. 2 also shows that the rise of B antibodies in individual patients was correlated with the initial titre of the serum, so that patients with low initial levels of antibody (8–32) more often showed increases in antibody than did those with high initial levels (128–512)

For 16 pairs of sera the results of the Hirst test were checked by neutralisation tests in mice, the sera included specimens in which the rise was considerable *and others in which it was* small The results were plotted graphically as by Hirst (1942) Correlation was good, though not quite so close as in Hirst's results with influenza A virus; *this is doubtless* largely accounted for by the variable introduced into the tests with B virus by the unavoidable use of cells from different *fowls.*



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SUMMARY

1. Early in 1942 examination of convalescent sera by the Hirst technique, and transmission of garglings to ferrets and developing eggs, failed to reveal any evidence that the mild influenza outbreaks then occurring were due to influenza viruses A or B.

2. A mild increase in the incidence of acute respiratory infections early in 1943 was associated with serological evidence of influenza B virus infection. Later in the season (March to June) small scattered outbreaks of A virus infection were encountered.

3. The value and the limitations of the Hirst test are discussed.

We extend our grateful thanks to numerous doctors, both Service and civilian, and especially to the 1st Medical General Laboratory, APO 519, US Army, for unfailing help in facilitating this investigation. We are especially indebted to Dr. C. H. Andrewes, FRS, for advice and assistance in preparing our report.

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INFLUENZA VIRUS B

ISOLATED FROM A FATAL CASE OF PNEUMONIA

F. HIMMELWEIT, MD BERLIN, PHD LOND, MRCPE

(*From the Section of Virus Research, Inoculation Department, St. Mary's Hospital, London*)

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CASE-HISTORY AND POST-MORTEM FINDINGS

The patient, a man aged 55, fell ill on Feb. 8, 1943, and thought he had influenza. Next day he was much worse, with precordial pain and pyrexia, and in the evening he had a hæmoptysis (about ½ pint). He became semi-conscious, and on Feb. 10 was admitted to St. Mary's Hospital, moribund. He died before being clinically examined. The following were the findings at autopsy on Feb. 11:—

Respiratory system.—Dark altered blood exuded from the nose. The larynx and trachea were rough and reddened; thin, grey, friable membrane in patches on cartilages gave a banded appearance to the inner surface. There was much frothy bloodstained fluid in the trachea and bronchi. Both pleural cavities also contained bloodstained fluid. The lungs were dark and heavy; there was no fibrin on the surface, [illegible] œdema with patchy peri- [illegible] at all the surface epithelium of the trachea was shed; there was little fibrin on the surface and there were masses of staphylococci, but few leucocytes. The epithelium of the bronchi was also shed. The lungs showed patchy bronchopneumonia, necrosis near brochioles, much hæmorrhage, and many staphylococci.

Other findings.—Cloudy swelling of myocardium, liver and kidneys; early septic spleen.

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ISOLATION OF VIRUS

Eighteen hours after the patient's death a bacteria-free filtrate of lung tissue was prepared for inoculation of a ferret and mice.

Preparation of filtrate.—The current method of obtaining virus filtrates involves clarification of a tissue suspension through paper and asbestos pulp (Elford 1938). A method developed during the past year makes it possible to dispense with this initial clarification with consequent saving of time and labour.

After the usual centrifugation of the tissue suspension at 3000 rev./min. for 30 minutes, the supernatant fluid is filtered through three superimposed 'Gradocol' membranes. The membranes, which were prepared in this department, had an average pore diameter (APD) of 1·5μ 1·05μ and 0·7μ; they were so arranged that the suspension had to pass first through the membrane with the largest APD and last through the one with the smallest APD. The membranes thus act in succession as traps for particles of decreasing size, and each membrane holds back particles which would tend to block the pores of the next one. The membrane of 0·7μ APD retains bacteria.

By this method the volume of filtrate per unit area of membrane is about half that obtained by the method involving preliminary clarification. On the other hand, it is found possible to use tis [illegible] is comparatively smaller, [illegible] the 50% end-point calculation method of Reed and Muench (1938) is two or three times that normally obtained.

This method was used for the preparation of a filtrate from a 20% suspension of lung tissue from the case described above.

Inoculation of ferrets.—The filtrate (1·0 c.cm.) was passed to a ferret in the usual way and a slight rise of temperature (103° F.) was observed after 88 hours.[1] The animal was listless, but no other signs were observed. On post-mortem examination nothing abnormal was seen.

A filtrate from a 10% suspension of the turbinates, prepared by the method outlined above, was passed to a second ferret four days after the initial inoculation. The temperature rose to 103·8° F. after 64 hours. A third ferret similarly inoculated from a filtrate of the turbinates of the second ferret produced a temperature of 103° F. after 64 hours and in this animal congestion of the turbinates and a slight livid discoloration of one lung lobe was seen. Subsequent passages were made to 21 ferrets in all, at intervals of three to four days, involving 19 regular passages. The 17th and 18th passages were done in duplicate; 1 ferret of each of these two passages was bled after a fortnight to obtain sera; all the others were killed on the third or fourth day. From the 4th ferret passage onwards, all showed congestion of the turbinates and more or less extensive livid areas on the lungs; all reached their maximum temperature 48 hours after inoculation. Ferrets 7, 8 and 21 showed temperatures between 104° F. and 105° F. Most of the animals were obviously ill, listless and eating little; 5 had wet noses and sneezed. In general these effects were similar to those observed by Francis in ferrets inoculated with influenza virus B.

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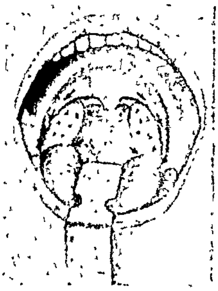

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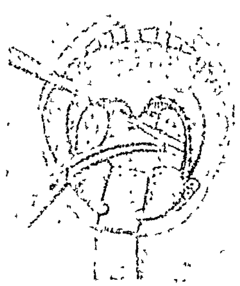
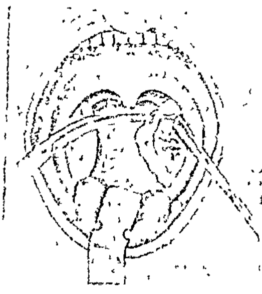


2

Fig. 1—The arrows show the direction of the needle for the injections of local anæsthetic.

Fig. 2—With traction on the tonsil the incision is made from below upwards and sweeps around the upper pole and down the free edge of the posterior pillar, as indicated by arrows.



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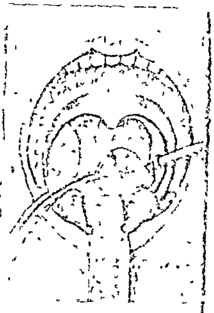

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Fig. 3—The œdematous tissue behind the tonsil is broken down by blunt dissection, the upper pole being freed first.

Fig. 4—The tonsil now remains attached only by a pedicle. The snare is then tightened over the pedicle and the tonsil thus completely enucleated.

have some locking device on the tip of the syringe (Galbraith's hæmorrhoidal needle is suitable).

Five injections, each of 5 c.cm. of ½% novutox, are made into each tonsil area; in this low dilution 50 c.cm. is quite harmless. The first injection is made at the top of the anterior [illegible] tip of the [illegible] The second [illegible] free border, with the needle pointing directly downwards. The third, and most important, is made at the junction of the anterior pillar and base of the tongue, the needle point being directed downwards and inwards. For the fourth injection the point of the needle is inserted behind the posterior pillar as high as possible and in an upward direction, the syringe being drawn over into the opposite angle of the mouth. The fifth injection is made behind the posterior pillar as low as possible, the point of the needle being directed downwards and outwards, with the syringe drawn well over into the angle of the mouth (fig. 1).

When the injection of both tonsils has been completed there will be considerable local swelling due to the injected fluid. The patient should wait for not less than ten minutes before the dissection is begun, so that absorption may properly take place.

Operation.—The patient is brought back to his chair and a sterile towel is fastened around his neck, with another over his head which covers his eyes. He sits with his chair drawn well forward, close to the operator's stool, one hand being placed on each of the operator's knees. An assistant standing behind the patient's chair steadies the head in his two hands, turning it gently to right or left as the surgeon may desire.

Throughout the operation it is desirable to keep up a stream of reassuring or even impersonal conversation. This may seem a trivial point, but it does help to keep the patient's attention distracted, and is always appreciated. In Vienna this is called "vocal anæsthesia."

No gag is necessary. The patient is asked to open his mouth, and the tonsil behind the œdematous anterior pillar is gripped by the volsellum. A tongue-depressor may be used in the left hand for this procedure, but afterwards this may be discarded, for the tongue is easily controlled by the depressed volsellum.

Exerting slight traction on the volsellum, an incision is now made along the free margin of the anterior pillar from below upwards. This [illegible] tonsil to the base of the [illegible] posterior pillar for abc [illegible] dissector the œdematous [illegible] and easily wiped away from the tonsil, and, as traction is exerted on it, the stripping down proceeds until the tonsil is attached only by the lingual prolongation (fig. 3). This stripping may be made more easily by a flat rake-like instrument with fine teeth, and, should it be necessary, force may be used in the separation of the lower half of the tonsil from its bed without hurting the patient. The tonsil must be entirely free, except for its attachment by the lingual prolongation, before its removal is attempted. It is especially important to see that it has been completely separated from the anterior pillar at its lower extremity in order to avoid damage to the pillar.

The snare may now be slipped over the handle of the volsellum, and, by a series of light shaking movements, forced down to the base of the lingual prolongation. Here it may be tightened until it cuts through (fig. 4). The tonsillar *fossa will now be found to be absolutely* smooth and clean, with both pillars free and intact.

Though there will have been no bleeding, I pack the fossa with a wad of moistened wool, well wrung out, before proceeding with the next tonsil. When the wool is removed at the end of the operation, the fossa should be quite dry. If there should be an oozing point it can be controlled by the application of artery forceps for two minutes.

The total time occupied in the removal of both tonsils seldom exceeds three minutes. Should there be two or more tonsillectomies on the operation list, it saves a considerable amount of time if the injections are given immediately one after the other, the first dissection being started after the last injection. With two sets of instruments it should be possible to complete five to six cases in an hour.

Postoperative period.—The patient is allowed to sit out of bed on the evening of the third day, and is sent home on the fifth or sixth day. He should be able to resume his normal life within a fortnight of the operation.

COMMENTS

It may be argued by or for the patient that the idea of a local anæsthetic distresses them, or that the operation would be almost impossible because of "sensitivity of the throat," but nearly all patients can be persuaded to favour this method if it is explained properly, and most of the apprehension at the time of operation is removed [illegible] recall only one case where, [illegible] I was unable to complete the [illegible] sthesia. The cough reflex is [illegible] preliminary cocaine spray. [illegible] allowed to see or hear instruments either before or after the operation, and the possibility of seeing blood should be reduced to an absolut [illegible] ment a [illegible] or "It [illegible] if not a [illegible] when asked. I have never seen any complications from the injection of this large quantity of local anæsthetic.

It has not been found necessary to ligature a vessel, for should there be any oozing this can be effectively controlled either by the temporary application of an artery forceps or by inserting a cotton-wool plug wrung out dry in turpentine. Bleeding after the patient is back in bed is due either to an incomplete dissection or to having allowed the patient to leave the theatre while there was still a slight ooze from the tonsillar fossa. *Secondary hæmorrhage is very uncommon.*

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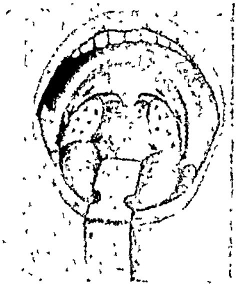

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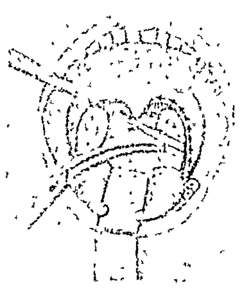

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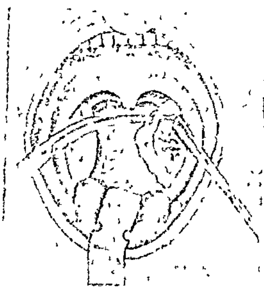

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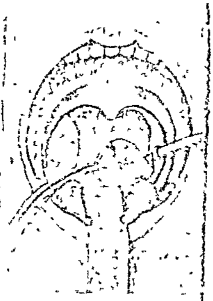

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Fig. 1—The arrows show the direction of the needle for the injections of local anæsthetic.

Fig. 2—With traction on the tonsil the incision is made from below upwards and sweeps around the upper pole and down the free edge of the posterior pillar, as indicated by arrows.

Fig. 3—The œdematous tissue behind the tonsil is broken down by blunt dissection, the upper pole being freed first.

Fig. 4—The tonsil now remains attached only by a pedicle. The snare is then tightened over the pedicle and the tonsil thus completely enucleated.

have some locking device on the tip of the syringe (Galbraith's hæmorrhoidal needle is suitable).

Five injections, each of 5 c.cm. of ½% novutox, are made into each tonsil area; in this low dilution 50 c.cm. is quite harmless. The first injection is made at the top of the anterior
[illegible] tip of the
[illegible] The second
[illegible] free border,
with the needle pointing directly downwards. The third, *and most important, is made at the junction of the anterior* pillar and base of the tongue, the needle point being directed downwards and inwards. For the fourth injection the point of the needle is inserted behind the posterior pillar as high as possible and in an upward direction, the syringe being drawn over into the opposite angle of the mouth. The fifth injection is made behind the posterior pillar as low as possible, the point of the needle being directed downwards and outwards, with the syringe drawn well over into the angle of the mouth (fig. 1).

When the injection of both tonsils has been completed there will be considerable local swelling due to the injected fluid. The patient should wait for not less than ten minutes before the dissection is begun, so that absorption may properly take place.

Operation.—The patient is brought back to his chair and a sterile towel is fastened around his neck, with another over his head which covers his eyes. He sits with his chair drawn well forward, close to the operator's stool, one hand being placed on each of the operator's knees. An assistant standing behind the patient's chair steadies the head in his two hands, turning it gently to right or left as the surgeon may desire.

Throughout the operation it is desirable to keep up a stream of reassuring or even impersonal conversation. This may seem a trivial point, but it does help to keep the patient's attention distracted, and is always appreciated. In Vienna this is called "vocal anæsthesia."

No gag is necessary. The patient is asked to open his mouth, and the tonsil behind the œdematous anterior pillar is gripped by the volsellum. A tongue-depressor may be used in the left hand for this procedure, but afterwards this may be discarded, for the tongue is easily controlled by the depressed volsellum.

Exerting slight traction on the volsellum, an incision is now made along the free margin of the anterior pillar from below upwards. This
tonsil to the base of the
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and easily wiped away from the tonsil, and, as traction is exerted on it, the stripping down proceeds until the tonsil is attached only by the lingual prolongation (fig. 3). *This stripping may be made more easily by a flat rake-like instrument with fine teeth, and, should it be necessary, force may be used in the separation of the lower half of the tonsil from* its bed without hurting the patient. The tonsil must be entirely free, except for its attachment by the lingual prolongation, before its removal is attempted. It is especially important to see that it has been completely separated from the anterior pillar at its lower extremity in order to avoid damage to the pillar.

The snare may now be slipped over the handle of the volsellum, and, by a series of light shaking movements, forced down to the base of the lingual prolongation. Here it may be tightened until it cuts through (fig. 4). The tonsillar *fossa will now be found to be absolutely smooth and clean,* with both pillars free and intact.

Though there will have been no bleeding, I pack the fossa *with a wad of moistened wool, well wrung out, before* proceeding with the next tonsil. When the wool is removed at the end of the operation, the fossa should be quite dry. If there should be an oozing point it can be controlled by the application of artery forceps for two minutes.

The total time occupied in the removal of both tonsils seldom exceeds three minutes. Should there be two or more tonsillectomies on the operation list, it saves a considerable amount of time if the injections are given immediately one after the other, the first dissection being started after the last injection. With two sets of instruments it should be possible to complete five to six cases in an hour.

Postoperative period.—The patient is allowed to sit out of bed on the evening of the third day, and is sent home on the fifth or sixth day. He should be able to resume his normal life within a fortnight of the operation.

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DISTRIBUTION

With the decline of tuberculosis from the beginning of the present century until recently, a decline interrupted during the last war, it was to be expected that an increasing number of persons would escape infection during childhood and that primary tuberculosis would be found more frequently in adults. Extensive Mantoux testing in recent years in the United States, France and Germany showed a high proportion of young adults to be non-reactors to tuberculin. Long and Seibert (1937) found that the majority of students entering universities in the western states of America in 1935 and 1936 were Mantoux negative. Manderli (1940) said that about 50% of German army recruits were Mantoux negative. Meersseman (1937) found a similar condition in the French army, and has repeatedly commented on the frequency, the mildness of symptoms and the scarcity of fatal results of primary infection among recruits in the French army. Since there are few published figures it is difficult to estimate what percentage of young adults in this country are non-reactors but it may be assumed that primary tuberculosis is no longer confined to children. There appears to be no difference between primary tuberculous infection in the child and in the adult. Sweany (1941), who has done much work on the pathology of primary foci, says there is no essential difference due to age. Myers (1938) thinks that the belief in rapidly progressive disease in adults not previously infected is a myth.

During the last year ten cases of primary pulmonary tuberculosis were diagnosed in the adult medical wards of Stoke Mandeville Hospital. Three of the patients were under 20 years of age; the other seven were between 20 and 28. With the exception of two patients who developed a pleural effusion a couple of weeks after onset [illegible] duratio[illegible] one ha[illegible] effusio[illegible] hæmat[illegible] cleared [illegible] All ten [illegible] effects of their primary infection. In each instance the chest film showed pulmonary shadows suggestive of a primary complex. In [illegible] sputum, [illegible] for the obtained by the usual [illegible] human tubercle bacillus. In [illegible], type were demonstrated by gastric lavage and culture on Loewenstein medium. To obviate any possible doubt regarding the pathogenicity of bacilli thus demonstrated guineapigs were inoculated in two cases. The guineapigs on autopsy showed active tuberculous lesions. Three of the patients had erythema nodosum. Tubercle bacilli of human type were grown on medium after gastric lavage in each case of erythema nodosum. Where circumstances permitted, follow-up gastric lavages and cultures were performed after recovery, and arrangements were made for an X-ray [illegible] 3–6 months. Since nine o[illegible] places outside the jurisdictio[illegible] of finding the sources of their infection devolved on others. The source of infection of the tenth patient was found and isolated.

SUMMARY

An account is given of primary pulmonary tuberculosis and how it differs from postprimary or secondary forms of the disease.

Emphasis is laid on the importance of gastric lavage followed by culture, or guineapig inoculation, as the most effective method of proving the ætiology.

Except when constantly exposed to heavy dosage, or under abnormal conditions, the symptoms are mild and death during the primary infection phase is comparatively rare.

Sanatorium care, on account of the short duration of illness and the danger of continued exogenous infection to the patient, is not advisable.

Ten cases of primary tuberculous infection in young adults are briefly reported.

My thanks are due to Dr. T. Izod Bennett for permission to report these cases and to Prof. J. McIntosh and the staff of the department of pathology for laboratory assistance. Acknowledgment is made to the Director-General of Medical Services, Ministry of Pensions, for permission to publish this paper.

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CARCINOMA OF THE ŒSOPHAGUS

G. H. Steele, M S LOND, F R C S
SURGEON, ROYAL SURREY COUNTY HOSPITAL, GUILDFORD

THE following case seems to be the first recorded in this country of recovery from resection with anastomosis of a carcinoma of the œsophagus, although several cases have been reported from other countries.

CASE-HISTORY

A woman, aged 53, complained of dysphagia of three months' duration; latterly only fluids and small quantities of semi-solids had been swallowed. X rays showed a filling defect in the œsophagus 1¼ in. above the diaphragm, and œsophagoscopy revealed a typical malignant ulcer at this level which, on biopsy, proved to be a squamous epithelioma. At a first operation on Feb. 1, 1943 (local anæsthesia, and gas and oxygen), a Kader-Senn gastrostomy was performed, the stomach being pulled as far over to the left as possible. At the same time the proximal end of the stomach was investigated; the growth was found to have extended ¼ in. distal to the cardia and some mobile enlarged glands were present along the lesser curvature. At a second operation on Feb. 16 (avertin, and gas and oxygen), the thorax was opened through a long intercostal incision in the ninth space, extending from the costal margin in front to the transverse process of the vertebra behind; the lateral part of the erector spinæ was divided, as was the neck of the rib on each side of the incision to facilitate retraction. T primary infection is often difficult and sometimes unsuccessful. In the former instance the source is invariably found in the child's home; in the latter the source is commonly outside the home. Infants, children and adults all have a considerable resistance to primary tuberculous infection; otherwise few would survive infection. Massive infection may overcome that resistance. Lurie (1941), in his important work on inherited constitutional resistance in rabbits, has shown that the greater relative resistance exhibited by some strains [illegible] nd that under [illegible] p a generalised [illegible] esistant strains develop from a small dosage. Here clinical experience and animal experiment appear to correspond.

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ROYAL SOCIETY OF MEDICINE

AT a meeting of the Section of Psychiatry on Dec. 14, with Dr. W. NORWOOD EAST, the president, in the chair, Dr. JOSHUA BIERER discussed

A New Form of Group Psychotherapy

It has been asked, he said, why the discoveries of modern psychotherapy have not been extensively applied in mental hospital practice. Until recently we had found no practical method of using them, but this objection, he feels, no longer holds good. Mind and body are one entity, and this entity is part of a larger entity—society. A man working in industry lacks the chance to develop initiative and responsibility. In the dissatisfaction of people during the past thirty years he sees a reaction not to their economic situation but to psychological slavery. He described an experiment in the form of patients' social clubs, two of them in a public mental hospital and four attached to the outpatient departments of voluntary hospitals. The clubs were started with three main ideas. First, it was felt that patients robbed of freedom might improve if they were given a temporary illusion of freedom in the club. Secondly, they might improve faster and relapse less readily if they were trained in hospital to mix with other people socially and encouraged to accept responsibility and use initiative. Thirdly, helpful situations might be contrived for them in the club. Patients dread the loss of freedom entailed in mental hospital care, especially since the period of imprisonment is indefinite. The possibility of being a [illegible] were [illegible] her, [illegible] elop [illegible] did not lack ideas. [illegible]

times a week, bu [illegible]

the meetings to [illegible]

separately once a [illegible]

meetings. It is run on democratic lines, a fresh group of officers being elected every three months; the chief officers are chairman, vice-chairman, secretary, and conveners of magazine, sports and house committees. The frequent changes of officers give more members a period of responsibility and a chance to use initiative. The council makes out the programme of meetings, considers [illegible] nbers, and organises [illegible] spital staff can attenc [illegible] one of the [illegible] they have [illegible] always receiving. [illegible] the recommendation of their doctor; they are introduced as guests by members, and are elected at the next general meeting. The first club was for acute patients and non-deteriorated chronic patients. In 4 years 300 have attended it, with an average attendance of 50. Members are of both sexes; they range in age from 15 to 70, and have almost as wide a difference in social and intellectual standards, which has not proved a drawback. They were suffering from schizophrenia, anxiety states, depression, neurasthenia, paranoia and so on. The meetings undertook community work, discussions and lectures, card-drives, dancing, sports and rambles, and preparation of food. The officers had training in the running of a second club for chronic patients.

Difficulties have of course to be overcome. The [illegible] the group inevitably [illegible] or and an individual. [illegible]

learn to overcome their sh [illegible] may have difficulty in hand [illegible] ence of a patient to his own psy [illegible] with his transference to the psychotherapist guiding the club. The relationship of the patients to each other has happily been good, showing none of the gossip, jealousy and petty encounters found in clubs for normal people. In order to give patients a real sense of freedom of action any work done by the staff must be behind the scenes, and they must [illegible]

Starting with the [illegible]

with as much freec [illegible] prepared [illegible] been no [illegible] o cases [illegible] ed. For many patients the experience and responsibility of serving on the council renewed self-confidence. A few months ago a second club was started for chronic and deteriorated patients; this is not yet self-governing. Meetings encourage collective activities, community singing, simple games and dancing. Ex-officers of the first club run it and it gives them joy to find they can provide something which their less fortunate fellows appreciate.

Outpatient clubs have been founded to help discharged patients to maintain the social adjustment begun in hospital, and possibly to reduce relapses. Nearly every patient in the outpatient department has difficulty in adopting himself socially, and many have no social life at all. To avoid stigma, clubs meet in buildings outside the hospital. Membership is not limited to patients; anyone who is properly introduced may become a member. Doctors take no office, but one is always present. Meetings are held weekly and the light expenses are met by the members. Clubs are now in action in East Ham and Southend (for Runwell and Southend General Hospital patients) and in connexion with Bart's and Guy's psychiatric outpatient departments. Average attendance at Bart's club is 30, and at the others 15. These clubs, like those within the hospital, have provided social opportunities for those who for one reason or another felt cut off from their fellows. Dr. Bierer feels that the clubs combat shyness, loneliness, general and social inferiority feelings, sexual maladjustment, lack of incentive and aim in life, inability to cooperate with others, claustrophobia and agarophobia, parental domination, acute disappointment and physical defects. He suggested that other mental hospitals and outpatient departments might organise such clubs. "By helping the patient to make human relationships," he concluded, "we destroy the proof of his failure and so begin rebuilding a healthy personality."

DISCUSSION

Dr. E. B. STRAUSS said that the Bart's outpatient club had proved a valuable auxiliary to treatment. He pointed out that Dr. Bierer saw the patient's problem in terms of frustration at the level of the herd or community instinct. At the bottom of most psychological maladjustment is lack of a sense of personal validity; and any interests which restored this sense are acceptable.

Dr. J. MAXWELL JONES asked whether any ordinary club in the district would not serve equally well.—Dr. T. P. REES endorsed the opportunity which a club gives for the sexes to meet and mix. There is too rigid a separation of the sexes, he considers, in most mental hospitals. They have a patients' club at Warlingham, though not, he admitted, run on the democratic lines advocated by Dr. Bierer. At one time the club-room was open all day, but it proved so popular that the patients went there when they should have been engage in occupational therapy; so that it is now open on [illegible]

thanks to attendance at the club.

REPLY

In replying Dr. BIERER referred to mass psycho [illegible] y, b [illegible] ch th [illegible] embe [illegible] ype o [illegible] umple [illegible] oblem [illegible] parallel to his own; and he will do so without realizin [illegible] at the time that he is discussing his own problem. [illegible] later he profits by the increased insight he [illegible] from a case of acute and fulminating pulmonary aspergillosis; Dr. I. **Friedmann** (Prague) the preparation and use of dried egg powder as a substitute for fresh eggs in the preparation of media for the cultivation of tubercle bacilli; and Dr. F. **Pick** (Prague) microscopical sections from the organs of a child showing extensive cellular reactions which had been variously diagnosed as infectious granuloma and a congenital lipoid dystrophy.

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At a meeting of the Section of Psychiatry on Dec. 14, with Dr. W. **Norwood East**, the president, in the chair, Dr. **Joshua Bierer** discussed

A New Form of Group Psychotherapy

It has been asked, he said, why the discoveries of modern psychotherapy have not been extensively applied in mental hospital practice. Until recently we had found no practical method of using them, but this objection, he feels, no longer holds good. Mind and body are one entity, and this entity is part of a larger entity—society. A man working in industry lacks the chance to develop initiative and responsibility. In the dissatisfaction of people during the past thirty years he sees a reaction not to their economic situation but to psychological slavery. He described an experiment in the form of patients' social clubs, two of them in a public mental hospital and four attached to the outpatient departments of voluntary hospitals. The clubs were started with three main ideas. First, it was felt that patients robbed of freedom might improve if they were given a temporary illusion of freedom in the club. Secondly, they might improve faster and relapse less readily if they were trained in hospital to mix with other people socially and encouraged to accept responsibility and use initiative. Thirdly, helpful situations might be contrived for them in the club. Patients dread the loss of freedom entailed in mental hospital care, especially since the period of imprisonment is indefinite. The possibility of being a
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meetings. It is run on democratic lines, a fresh group of officers being elected every three months; the chief officers are chairman, vice-chairman, secretary, and conveners of magazine, sports and house committees. The frequent changes of officers give more members a period of responsibility and a chance to use initiative. The council makes out the programme of meetings,
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[illegible] the recommendation of their doctor; they are introduced as guests by members, and are elected at the next general meeting. The first club was for acute patients and non-deteriorated chronic patients. In 4 years 300 have attended it, with an average attendance of 50. Members are of both sexes; they range in age from 15 to 70, and have almost as wide a difference in social and intellectual standards, which has not proved a drawback. They were suffering from schizophrenia, anxiety states, depression, neurasthenia, paranoia and so on. The meetings undertook community work, discussions and lectures, card-drives, dancing, sports and rambles, and preparation of food. The officers had training in the running of a second club for chronic patients.

Difficulties have of course to be overcome. The
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ence of a patient to his own [illegible]
with his transference to the psychotherapist guiding the club. The relationship of the patients to each other has happily been good, showing none of the gossip, jealousy and petty encounters found in clubs for normal people. In order to give patients a real sense of freedom of action any work done by the staff must be behind the scenes, and they must [illegible]
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[illegible] ed. For many patients the experience and responsibility of serving on the council renewed self-confidence. A few months ago a second club was started for chronic and deteriorated patients; this is not yet self-governing. Meetings encourage collective activities, community singing, simple games and dancing. Ex-officers of the first club run it and it gives them joy to find they can provide something which their less fortunate fellows appreciate.

Outpatient clubs have been founded to help discharged patients to maintain the social adjustment begun in hospital, and possibly to reduce relapses. Nearly every patient in the outpatient department has difficulty in adopting himself socially, and many have no social life at all. To avoid stigma, clubs meet in buildings outside the hospital. Membership is not limited to patients; anyone who is properly introduced may become a member. Doctors take no office, but one is always present. Meetings are held weekly and the light expenses are met by the members. Clubs are now in action in East Ham and Southend (for Runwell and Southend General Hospital patients) and in connexion with Bart's and Guy's psychiatric outpatient departments. Average attendance at Bart's club is 30, and at the others 15. These clubs, like those within the hospital, have provided social opportunities for those who for one reason or another felt cut off from their fellows. Dr. Bierer feels that the clubs combat shyness, loneliness, general and social inferiority feelings, sexual maladjustment, lack of incentive and aim in life, inability to cooperate with others, claustrophobia and agarophobia, parental domination, acute disappointment and physical defects. He suggested that other mental hospitals and outpatient departments might organise such clubs. "By helping the patient to make human relationships," he concluded, "we destroy the proof of his failure and so begin rebuilding a healthy personality."

DISCUSSION

Dr. E. B. **Strauss** said that the Bart's outpatient club had proved a valuable auxiliary to treatment. He pointed out that Dr. Bierer saw the patient's problem in terms of frustration at the level of the herd or community instinct. At the bottom of most psychological maladjustment is lack of a sense of personal validity; and any interests which restored this sense are acceptable.

Dr. J. **Maxwell Jones** asked whether any ordinary club in the district would not serve equally well.—Dr. T. P. **Rees** endorsed the opportunity which a club gives for the sexes to meet and mix. There is too rigid a separation of the sexes, he considers, in most mental hospitals. They have a patients' club at Warlingham, though not, he admitted, run on the democratic lines advocated by Dr. Bierer. At one time the club-room was open all day, but it proved so popular that the patients went there when they should have been engaged in occupational therapy; so that it is now open only

thanks to attendance at the club.

REPLY

In replying Dr. **Bierer** referred to mass psycho-
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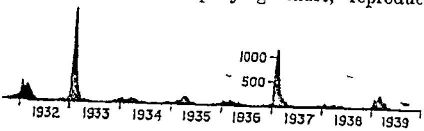
parallel to his own; and he will do so without realising at the time that he is discussing his own problem.
later he profits by the increased insight he

THE LANCET

LONDON: SATURDAY, DECEMBER 25, 1913

INFLUENZA

There is an inevitable fascination in contemplating [illegible] influenza, in [illegible] year and not in another, and in peering thence into what lies ahead. This pastime has been rather more profitable since 1933 when a virus, now called influenza A virus, became amenable to laboratory study, and still more so since 1940, when a second agent, influenza B virus, was recognised. We can now be sure that there is every winter a basic level of respiratory infection which is not due to either virus, and that in some years a superimposed wave is caused by virus A, at other times by its brother, B. In Britain for the last decade these waves have all been in the early months of the year. Before B was recognised, there were widespread A outbreaks in 1933 and 1937 with a lesser one in 1935. The accompanying chart, reproduced by courtesy of the Ministry of Health, shows deaths from influenzal pneumonia in London and the great towns. A minor outbreak in 1939 was partly due to A, partly to B; another small-scale prevalence in early 1941 was associated with virus A only. Three papers in this issue record that what little influenza there was at the beginning of 1943 was largely caused by virus B, not at all by A. Clinically this influenza B was not to be distinguished from A, nor from certain other influenza-like illnesses of unknown cause in which no virus could be detected. None of the B outbreaks so far on record has been very widespread or severe. It seems that major peaks on the influenza curve mean that virus A is at large; and we understand that A is the culprit in the current epidemic. It is odd that A viruses are harder to establish in ferrets and mice when the epidemic is a minor one; and B seems even trickier to work with. **Stuart-Harris**, **Glover** and **Mills** failed to get any 1943 B strain to produce symptoms in ferrets or mice, or to infect chick embryos. **Himmelweit**, however, persuaded one strain to infect chick embryos, though not mice, after many passages through ferrets.



One point brought out by these papers is that right at the end of last winter's influenza season, just as virus B infections were petering out, virus A turned up and caused a few local outbreaks right into the summer. Here may well be an explanation of why influenza burst exceptionally early this winter; the virus was probably already in our midst, waiting for the seasonal conditions suitable for its rapid spread. Many will note that after four years of war an epidemic has come at a rather abnormal season; they will think of 1918 and will be anxious lest a repetition of the disastrous pandemic of that year may be imminent. It is true that a very early outbreak allows time for many unpleasant things to happen before spring, including a possible second wave caused by virus of changed character. But we may be comforted by the fact that by June, 1918, almost at the beginning of the first wave of the pandemic, there was a tendency for increased mortality to invade the age-groups under 30. There is now general agreement with the far-seeing **Greenwood** that this tendency was the cardinal feature of "1918." As yet there is fortunately no such tendency in the current visitation, but it is to be hoped that practitioners will keep a sharp look-out for this danger-signal. It remains to be seen whether there is any truth or significance in the influenza fatalities in young factory-workers just reported in the lay press as occurring in Berlin.

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FORMATION OF LYMPH IN THE LUNGS

The literature of lymph formation has been well reviewed of recent years,[6-11] and to **Drinker** and his colleagues at Harvard we owe a debt for their illuminating observations and opinions. They paid particular attention to the lungs, and their achievements have been due to the successful collection of lymph from the lungs of the dog; after which it was

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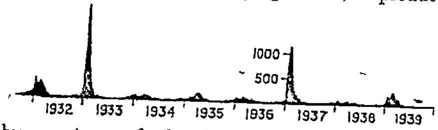

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a short step to the measurement of lymph flow under a variety of experimental conditions. Appreciation of the problems involved demands some knowledge of the anatomical arrangement of the lung lymphatics. For this knowledge William Snow Miller[12] is chiefly responsible and his views may be stated briefly as follows:—

> In the human lung the deep lymphatic system consists of four groups of lymphatics, the peribronchial, periarterial, perivenous and septal (interlobular), which communicate with one another especially where the bronchi divide. Miller states that no lymphatics are found beyond the alveolar ducts, from which region the four groups may be said to have a common origin. In general the lymph flow in the deep lymphatics is towards the lung hilum; there are, however, but few valves except at the hilum and just beneath the pleura where the venous lymphatics join the pleural lymphatics. On the other hand, the superficial lymphatic plexus of the pleura is provided with numerous valves, those in the main collecting trunks of the plexus opening towards the hilum. The deep and superficial lymphatic systems anastomose in the following manner: short connecting lymphatics accompany the branches of the pulmonary veins draining the pleura—they connect the pleural lymphatics with the lymphatics draining the alveolar ducts. These connecting lymphatics have valves which open towards the pleura and prevent the flow of lymph from the pleural lymphatics into the deep lymphatics. It follows that the zone where the short connecting lymphatics join the deep lymphatics draining the alveolar ducts may be considered as a lymph "shed." The "shed" is situated just beneath the pleura and averages 2–3 mm. in depth. Thus lymph formed in this zone may flow towards the lung hilum by way of the deep lymphatic system or towards the hilum by way of the short connecting lymphatics and superficial pleural lymphatic plexus. This means that the short connecting lymphatics furnish a bypath for the lymph by way of the pleural plexus in the event of obstruction to the deep lymphatic system.

From Miller's observations it would be expected that a transudate or exudate formed from the blood of the capillaries supplying the alveolar "ducts" and alveoli would find its way into the adjacent tissue spaces and be taken up by the lymph channels in the region of the alveolar ducts, whence it would be carried to the hilum of the lungs both by the deep lymphatics and by the superficial lymphatic plexus.

Under normal conditions the hydrostatic pressure in the pulmonary capillaries is probably below the osmotic pressure of the blood proteins; hence, if the pulmonary capillaries resemble those of the systemic circulation, they are organised for ridding themselves of excess fluid but not for the formation of fluid.[9,14] That the lungs can absorb large quantities of water has been demonstrated by Colin[13] who gave 21 litres of water to a horse intratracheally in 3½ hours without detriment to the animal. Whether all such fluid is absorbed by the blood capillaries is unknown, but it is not unlikely that some finds its way directly into the lymphatic spaces. The Harvard school have shown that the reverse process of transudation and exudation with consequent formation of lymph is potentiated by anoxia, by the inhalation of irritant gases and by strong respiratory movements. In the first two of these conditions capillary damage leading to greater permeability is the important factor, while the effect of respiratory movements is attributed to increased negative pressure in the chest which tends to promote pleural as well as pulmonary exudates even if oxygen lack is avoided. These Harvard experiments have their counterpart in the investigation of Yamada[14] who found pleural fluid in 29% of Japanese soldiers at rest and in 70% following severe muscular work. Drinker and Warren[15] suggest that in cardiac dyspnœa there is a tendency for fluid to be drawn from the pulmonary capillaries by the increased negative pressure, and, if anoxia is present, the resulting capillary damage augments this fluid formation. A pernicious process is thus set up; for the greater the amount of alveolar fluid, the less is the chance of oxygen reaching the blood in the capillaries. Administration of oxygen under anoxial conditions diminished the lung lymph flow, and this shows the importance of anticipating the start of the pernicious process by early oxygen treatment. Drinker and Warren believe that clinically we may fail to appreciate the patient's need for oxygen until too much time has passed: with present criteria the decision that oxygen treatment is needed usually comes about twelve hours too late. Incidentally, though there is general agreement that an increased capillary pressure favours transudation, it is probable that in the absence of the capillary damage this factor has been overestimated; thus "back-pressure" effects on the lung capillaries are not of primary importance.[9,16]

That the capillary wall allows protein to pass in either direction is indicated by the normal formation of lymph in the lungs and by experiments which show that foreign protein injected into the airway passes slowly into the blood-stream.[17] These issues are brought into focus by the admission that without more precise knowledge of the hydrostatic pressure in the pulmonary capillaries, and of the degree of permeability of the membrane, transudation phenomena cannot be interpreted. The assumption that the capillary pressure is midway between the pulmonary arterial and pulmonary venous pressure is probably unjustified; indeed it is likely that both pressure and permeability vary widely from moment to moment in any given part of the vascular bed because the state of the capillary is constantly changing. In this connexion Drinker and Warren[15] dismiss the idea that nervous mechanisms control the pulmonary vascular bed, but their view is hardly in accord either with experimental evidence[18] or with clinical experience.[16] The question seems to be not whether nerves exert control on the pulmonary vessels but rather to what degree and on what portions of the vascular bed they do so. All the lung capillaries are not open at one and the same time, for they have been seen to be continually opening and closing.[19] The blood flow even in fully open capillaries may show wide changes and on occasion reversal. Such activity, whether due to nervous or humoral mechanisms, will surely have some influence on the capillary pressure and on the permeability of the capillary walls. It is known, for instance, that the gaseous content of the blood influences capillary permeability; it is increased by a low oxygen and high carbon-dioxide content. One can imagine, therefore, that sluggish

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of genes between members of a chromosome pair) it is possible to produce strains which yield 100% females.

Recently, Gowen and Nelson[1] have announced the production of a strain the females of which produce 100% males, irrespective of the males to which they are mated. This result is due to a dominant gene whose action is limited to the female sex. Thus in drosophila, in one sense, complete sex-control is possible: stocks can be bred which yield offspring of one sex only, either females or males at will. The discovery of course can hardly be said to have any application to man. This is no simple matter of an injection or a pill, ensuring the arrival of a baby of the required sex. It hardly stirs the pulse to be told that some day, if the appropriate genes happen to be discovered in man, it might be possible after many generations of selective breeding to produce women whose fertilised ova of one sex or the other would die at a conveniently early stage. Primitive peoples, who eliminate unwanted babies as soon as they are born, would hardly regard the method as a practical advance.

ORIGIN AND PATTERN OF RETINAL HÆMORRHAGE

What determines the distribution of retinal hæmorrhages in vascular disease and what is the anatomical reason for their pattern? In his Montgomery lecture to Irish surgeons Ballantyne[2] gives an answer to these questions based on ophthalmoscopic and microscopical findings. Three common causes of retinal venous hæmorrhages are choked disc, subarachnoid hæmorrhage, and thrombosis of the central retinal vein. The immediate cause of the hæmorrhage in all three is the obstruction to the outflow of blood from the retinal veins, and yet the distribution of the hæmorrhage is different in each case. Ballantyne explains that in healthy blood-vessels extravasation of blood through the vessel walls from back pressure will be chiefly where the vessel changes course or where it receives increased or decreased support from surrounding tissues. At the optic disc the vessels both change their course and lose support, so that when pressure suddenly rises, as in choked disc, the hæmorrhages will be situated at and around the disc. In subarachnoid hæmorrhage the rise of pressure is most sudden, and here the hæmorrhages arise not only in the retina around the disc but also in the orbit where there is lack of support for the vessel wall. Thrombosis of the central retinal vein causes widespread venous hæmorrhage throughout the retina. Here, while the actual blockage has been sudden, this is only the final phase of a progressive obstruction. The vein behind the lamina cribrosa has been gradually narrowing, and the circulation in the vein getting slower, with the result that the vein walls suffer from anoxæmia and become devitalised. At the moment of final obstruction the pressure, acting on the weakened walls, causes hæmorrhage throughout their length. The exact source of a small retinal hæmorrhage can often be estimated by closely observing its shape. Such hæmorrhages are chiefly found in the intervals between visible retinal vessels, which suggests that they are capillary in origin. An interesting picture of capillary hæmorrhage is that in which a blood-vessel passing through a patch of hæmorrhage is accompanied by a blood-free zone—a pale band on either side of the blood column. This blood-free zone closely corresponds to the capillary-free zone found on either side of the retinal arteries.[3]

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from the arterial side of the capillary system, and are often seen in hypertension. Hæmorrhages from the venous side of the capillary system are usually found in the deeper retinal layers, because the efferent veins of the retina are derived from the deepest capillary plexus. They are especially common in the outer molecular layer, where owing to the direction of the fibres the tissues tend to split in a vertical direction, allowing the hæmorrhage, as seen with the ophthalmoscope, to assume a punctate or petechial form. Hæmorrhages of the kind are well seen in diabetic retinopathy.

AGRICULTURE AND MILK

After the war this country will again import large amounts of grain, sugar and other products more cheaply grown abroad; but if we are to raise the standard of nutrition British agriculture will have to provide more of the so-called protective foods—fruit, vegetables, eggs, and especially milk and dairy products. It does not follow that corn-growing and the traditional feeding for beef will fall below prewar levels; they may be higher. Each occupies an interdependent place in a system of mixed farming without which soil fertility cannot be maintained.

The war-time ploughing of millions of acres of permanent grass, much of very low quality, has produced arable crops; but there are already indications that it may easily lead to soil exhaustion which is being accelerated by the decrease in the number of livestock. Stapledon and Davies[1] nevertheless believe that it can do infinite good if we think in terms of sensible rotations and regrass as we go. Last year—and even more this year—there have been protests against the Ministry of Agriculture's policy of a larger and larger corn acreage, particularly in areas unsuited to corn production. Stapledon and Davies claim that the temporary ley (lea or sown pasture) will yield more animal food than the best permanent grass or any cereal, and will on the lowest estimate be equal to that of roots or kale. Even when these yields are transcribed into units of human food the temporary ley still compares favourably with most arable crops. Ley farming renders milk and corn production complementary, and it would cheapen milk production and make it less dependent on imported food-supplies. Some of the claims made for it may be disputed, but there can be no doubt that the policy of "taking the plough round the farm" is gaining in popularity.

If farmers have reasonable financial security and good technical advice they will no doubt respond to the nutritional needs of the nation, but the difficulties of their tasks and the inducement required should not be underestimated. At a discussion on milk held by the Nutrition Society some time ago Mr. J. L. Davies defined the three primary requirements of the milk industry as (1) a ten-year plan involving expenditure of £100 million on capital equipment urgently needed; (2) a large measure of control over the diseases of dairy cattle; and (3) an adequate supply of good labour for which a six-day week would be necessary. The risks from disease are greater in dairy-farming than in any other branch of livestock farming, and the control of tuberculosis and brucellosis, or even the production of clean milk, requires a degree of supervision unnecessary in other branches. Before the war milk production accounted for over a quarter of the total agricultural output, and milk was twice as important as any other single commodity; but if arable farming and livestock feeding are profitable over an extended period it is possible that fewer and fewer farmers will be interested in milk; as one of them said before the war, "If corn and beef production ever pay again I will gladly go into my dairy and smash every bottle in the place." The same applies to the [illegible] who milk the cows, either by machine or hand;

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Annotations

SULPHONAMIDES AND MENINGITIC SEQUELÆ

Maddock[1] has studied sequelæ in 1075 patients who recovered from cerebrospinal fever after chemotherapy. In every case the diagnosis had been bacteriologically proved; the nurses of the American Red Cross Harvard Unit Hospital paid the follow-up visits and either saw the patients or got information about them from relatives or neighbours. The time between discharge from hospital and the visit varied from 1 month to 2 years. In all, 254 (23·6%) complained of some disability dating from the attack. Headache was the commonest sequel, being present in 117. More serious symptoms were fortunately rarer; 6 had lost the sight of one eye, 1 of both eyes; 13 were totally deaf and 24 had impaired hearing. There was one case each of hydrocephalus, spastic paralysis and facial paralysis; 10 had strabismus; 18 were said to have changed in disposition and 9 children were retarded in development. Weakness of the legs was noted in 22, and muscular pains in 28. Other symptoms included errors of refraction, nervousness, irritability, poor memory, lack of concentration, easy tiring and depression. Maddock suggests that the list appears more formidable than the facts warrant, since these sequelæ are not all necessarily permanent. Headaches, for example. usually diminish in intensity and finally disappear. A group of 31 patients reported to have disabilities were fully examined by doctors 3–8 months after the nurses had made their visits; 16 of them had completely lost their symptoms and were in perfect health; in 7 the sequelæ reported had not been due to the illness; 2 had symptoms possibly due to meningitis but beginning to clear up; and in only 9 were there permanent sequelæ due to meningitis. The dosage of sulphonamide bore no apparent relation to the incidence of sequelæ, and Maddock supposes that in many patients damage to the central nervous system is probably done at the onset of the illness and is not affected by chemotherapy.

UNDER-WATER BLAST

An ingenious technique has been described by American workers for studying the effects of rapid compression waves on animals submerged in water. Since the results run closely parallel to those found by a number of observers[2] in man and animals exposed to depth-charges, it looks as though the laboratory worker were now provided with a simple way of investigating under-water blast without the limitations and fuss imposed by the use of explosive forces.

Clark and Ward[3] describe a method of subjecting animals to shock waves in water by dropping a weight on a floating plunger. In one end of a steel U-tube filled with water or saline is loosely fitted a wooden plunger on which a rack carrying a falling weight, released from any desired distance, is allowed to fall. The anæsthetised animal is in the other end of the U-tube, within a tubular cage of hardware cloth or, if water surging is to be wholly avoided, in a tin can, open at the top and almost filled with water. The impact so produced sets up waves very like those generated by setting off an explosive under water, with primary "compression" waves of extremely short duration (1/5000 sec.) and no surge of water such as occurs when the gases of an explosive expand. By varying the weight on the rack and the distance of fall a great variety of lesions may be produced. Under extreme conditions the animals are killed in a few minutes; with lighter impacts they survive longer or recover completely. The immediate effect is a rapid slowing of the heart-rate and cessation of respiration for a few seconds to more than a minute, followed by laboured and ineffectual respiratory movements. Intrapulmonary bleeding sets in at once and may lead to early death. Although occasional animals show loss of corneal reflexes, ataxia and incoördination immediately after the blow, direct involvement of the central nervous system is exceptional and electro-encephalograms provide no evidence of concussion at the time of the impact. Autopsy findings in these animals are identical with those described by Cameron, Short and Wakeley[4] and Williams[5]: they include massive pulmonary hæmorrhage, bruising and hæmorrhage in the stomach, lower ileum and cæcum, with occasional rupture of stomach or intestines and hæmorrhage into the peritoneal cavity or lumen of stomach and intestines. As pointed out by the British workers, the solid viscera, in contrast to air-containing cavities, rarely show damage.

Some of Clark and Ward's conclusions may be briefly summarised. The greater the impact, the more damage to the animal; the larger the animal the less the effect for a given impact. The more hunched-up the animal is in the water, the less seriously is it affected. With incomplete submersion, only that part of the animal below the water level at the time of impact shows the typical lesions. (The work of Cameron, Short and Wakeley,[3] does not, however, bear out this conclusion.) Damage is greater to fully inflated lungs than to deflated lungs. Protective coverings, such as cork or sponge rubber life-preservers, save the regions covered from much of the effect of an otherwise fatal blow.

PREDETERMINATION OF SEX

Fluctuations in the sex ratio during war, discussed by Dr. Martin on p. 807, remind us how little influence we have with our posterity, even at the outset. Only in the present century has the mechanism of sex-determination been elucidated. Basically it is simple enough in man. The sex-chromosome pair in the female somatic cell consists of two equal members, the X-chromosomes. The male somatic cell, on the other hand, contains an unequal pair, consisting of one X-chromosome and a smaller Y-chromosome. When the gametes are formed, the members of each chromosome-pair separate, so that whilst all ova contain an X-chromosome, half the spermatozoa contain an X-chromosome and half a Y-chromosome. Should it chance to be an X-bearing sperm which fertilises the ovum, the result is a girl; should it be a Y-bearing sperm, the result is a boy. Many other living things exhibit an identical or very similar mechanism. It is not always, it is true, quite as simple as the scheme just outlined, but in no case can the primary determination of the sex of the new individual be termed really complicated.

It is one thing, however, to understand how a mechanism operates and quite another to control it. Many possible approaches have been attempted, though nearly always with negative results up to the present. The day is probably far off when the sex of the future child can be determined at will—or indeed materially influenced—in the desired direction. It has been shown, however, in animal experiments that a tendency to produce an excess of females or of males may be to some extent genetic; and generations of selective breeding can on occasion produce strains which do yield some preponderance of one sex or of the other. Furthermore, in drosophila much more definite means of predetermination have been demonstrated. Lethal genes have been discovered which are sex-linked and by introducing them into the X-chromosomes by breeding methods it is possible to ensure that some at least of the XY individuals, the males, do not develop. In fact, by utilising in addition genes which inhibit crossing-over (that is, the interchange

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many who have worked a seven-day week for 52 weeks in the year for many years. Under these conditions standards of cleanliness tend to be low, and it is becoming harder to obtain cowmen—they would rather drive a tractor, work horses, or tend stock which at least do not need milking twice or three times every day.

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It is clear that the production of milk of high quality requires increased expenditure of money and effort, and a high standard of labour, all of which imply an increase in the price of milk. On the other hand if the optimum amount of milk is to be drunk the price must be lowered rather than raised. Control of disease, improved management, and particularly increased efficiency in distribution, may keep down the price. But it is not unlikely that the subsidising of milk for priority consumers will have to continue.

CANCER

> "One of the most hopeful features of the campaign against cancer is the fact that, in recent times, every year has made its special contribution to the sum of knowledge. When added together the contributions of the last ten years or so constitute a body of discovery so substantial as to justify the belief that the campaign is entering upon a new phase."

With this introduction the report rendered at the annual general meeting of the British Empire Cancer Campaign in Dec. 14 strikes an encouraging note. Three observations are picked out for special mention. One is the finding at the Royal Cancer Hospital that certain diets inhibit cancer of the mamma and cancer of the liver in mice. The second is statistical: an analysis of about 1000 cases of primary carcinoma of the lung reveals that the disease is four times as common in males as in females and that engineers, mechanics, and painters and decorators have a high incidence while clerks have a low one. Thirdly comes the confirmation of American statements that diethyl stilbœstrol inhibits the growth of prostatic cancer. This potent œstrogen, now widely used in clinical medicine, is an artificial substance synthesised by E. C. Dodds and his associates in 1938. It has been employed in cancer of the prostate by various surgeons in the United States and Canada in the hope that the secretory activity of prostatic metastases, like that of normal prostate, would be inhibited by the œstrogen. The cases mentioned in the present report are few. At the Middlesex Hospital one patient has been studied carefully for a year; at the Royal Cancer Hospital 2 patients seemed to derive no benefit either locally or generally, but in 5 others, which showed secondary deposits in bone, administration of stilbœstrol by mouth relieved the pain from these metastases, lowered the acid phosphatase level in the serum and also produced some degree of regression in the primary growth. This method of treatment is important in itself, for in England and Wales alone, Professor Dodds told the meeting, 4000 men die every year from prostatic cancer. But the chief significance of the work may lie in the fact that it is, in the words of the report, "possibly the first practical application of chemotherapy in the treatment of cancer." Stilbœstrol is a substance with many chemical affinities, and we may be sure they will be further explored.

THE HEART IN PREGNANCY

THE increasing care with which antenatal supervision is being carried out lends enhanced importance to the question of what constitutes a "normal" heart during pregnancy. The X-ray and electrocardiographic changes recorded in apparently healthy pregnant women have led to considerable controversy as to whether these indicate actual enlargement of the heart or merely an alteration in its position. In an attempt to clarify the issue, Hollander and Crawford[1] have carried out a routine examination in an unselected series of patients without any history, symptoms, or signs of heart disease who were first seen during the first 3 months of pregnancy. Anteroposterior and left and right oblique X rays of the heart were taken every 3 months during pregnancy and again 1 and 2 months after parturition; in addition electrocardiograms, using the two-string electrocardiograph thus obtaining simultaneous records of leads I and III, were taken every 4 weeks. As a result of rigorously excluding all patients who did not stay the course, their final observations are based on only 18 cases, but apparently the incomplete data in the other cases agreed with the findings in the fully investigated cases. The outstanding electrodardiographic changes were confined to lead III and consisted of a prominent, and even deep, Q wave and inversion of T, changes which occurred either together or separately. There was also a tendency for the electric axis deviation to show a shift to the left during the first 6 months of pregnancy and then swing to the right, the angle of axis deviation sometimes being as great as 28°, though it was usually nearer 15°. The important X-ray observation was the backward displacement of the œsophagus by the posterior surface of the heart, seen in 10 cases. Other changes noted were straightening of the left border of the cardiac shadow, prominence of the pulmonary conus, and an increase in the transverse diameter of the heart. The interpretation of these findings seems to be straightforward. The electrocardiographic changes are due to a shift of the heart to the left as a result of the raising of the diaphragm and rotation of the heart in the long axis. Cohn and Raisbeck[2] found similar large Q waves in lead III with rotating leads taken directly from the chest, and Thomson, Cohen and Hamilton[3] noted that the alterations in the Q and T waves were greater when the height of the diaphragm most affected the position of the heart. A strong argument against their being due to cardiac hypertrophy is that in Hollander and Crawford's experience the changes often disappeared towards the end of pregnancy. The radiological changes also can be explained on the basis of alteration in the position of the heart as a result of the raised diaphragm, but another factor probably comes into play here—the increased blood-volume which occurs during pregnancy and is accompanied by increased cardiac output. This attains its maximum at the 9th lunar month of pregnancy and then decreases steadily during the 10th month until by the 2nd month of the puerperium it has returned to normal.[4] Hollander and Crawford found that the indentation of the barium-filled œsophagus, present in the earlier stages of pregnancy, had practically disappeared by the 34th week of pregnancy. Their suggestion therefore seems valid, that this indentation is due to enlargement of the left auricle as a result of the increased volume of blood to be accommodated in the heart. These observations should facilitate the accurate diagnosis of early cardiac lesions during pregnancy and the puerperium.

The ARMY COUNCIL has decided that serving medical officers may participate in organised discussions, and express opinion, both individually and collectively, on the Government's forthcoming proposals for reorganisation of the civilian health services. Provided the discussions are held in off-duty hours, and Service channels of communication are not used to promote meetings or transmit opinions, there is "not only no objection to but every justification for such discussions being held."

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[1] Hollander, A. G. and Crawford, J. H. *Amer. Heart J.* 1943, **26**, 364.

[2] Cohn, A. E. and Raisbeck, M. J. *Heart*, 1922, **9**, 311.

[3] Thomson, K. J., Cohen, M. E. and Hamilton, B. E. *Amer. J. med. Sci.* 1938, **196**, 819.

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many who have worked a seven-day week for 52 weeks in the year for many years. Under these conditions standards of cleanliness tend to be low, and it is becoming harder to obtain cowmen—they would rather drive a tractor, work horses, or tend stock which at least do not need milking twice or three times every day.

It is clear that the production of milk of high quality requires increased expenditure of money and effort, and a high standard of labour, all of which imply an increase in the price of milk. On the other hand if the optimum amount of milk is to be drunk the price must be lowered rather than raised. Control of disease, improved management, and particularly increased efficiency in distribution, may keep down the price. But it is not unlikely that the subsidising of milk for priority consumers will have to continue.

CANCER

> "One of the most hopeful features of the campaign against cancer is the fact that, in recent times, every year has made its special contribution to the sum of knowledge. When added together the contributions of the last ten years or so constitute a body of discovery so substantial as to justify the belief that the campaign is entering upon a new phase."

With this introduction the report rendered at the annual general meeting of the British Empire Cancer Campaign in Dec. 14 strikes an encouraging note. Three observations are picked out for special mention. One is the finding at the Royal Cancer Hospital that certain diets inhibit cancer of the mamma and cancer of the liver in mice. The second is statistical: an analysis of about 1000 cases of primary carcinoma of the lung reveals that the disease is four times as common in males as in females and that engineers, mechanics, and painters and decorators have a high incidence while clerks have a low one. Thirdly comes the confirmation of American statements that diethyl stilbœstrol inhibits the growth of prostatic cancer. This potent œstrogen, now widely used in clinical medicine, is an artificial substance synthesised by E. C. Dodds and his associates in 1938. It has been employed in cancer of the prostate by various surgeons in the United States and Canada in the hope that the secretory activity of prostatic metastases, like that of normal prostate, would be inhibited by the œstrogen. The cases mentioned in the present report are few. At the Middlesex Hospital one patient has been studied carefully for a year; at the Royal Cancer Hospital 2 patients seemed to derive no benefit either locally or generally, but in 5 others, which showed secondary deposits in bone, administration of stilbœstrol by mouth relieved the pain from these metastases, lowered the acid phosphatase level in the serum and also produced some degree of regression in the primary growth. This method of treatment is important in itself, for in England and Wales alone, Professor Dodds told the meeting, 4000 men die every year from prostatic cancer. But the chief significance of the work may lie in the fact that it is, in the words of the report, "possibly the first practical application of chemotherapy in the treatment of cancer." Stilbœstrol is a substance with many chemical affinities, and we may be sure they will be further explored.

THE HEART IN PREGNANCY

THE increasing care with which antenatal supervision is being carried out lends enhanced importance to the question of what constitutes a "normal" heart during pregnancy. The X-ray and electrocardiographic changes recorded in apparently healthy pregnant women have led to considerable controversy as to whether these indicate actual enlargement of the heart or merely an alteration in its position. In an attempt to clarify the issue, Hollander and Crawford[1] have carried out a routine examination in an unselected series of patients without any history, symptoms, or signs of heart disease who were first seen during the first 3 months of pregnancy. Anteroposterior and left and right oblique X rays of the heart were taken every 3 months during pregnancy and again 1 and 2 months after parturition; in addition electrocardiograms, using the two-string electrocardiograph thus obtaining simultaneous records of leads I and III, were taken every 4 weeks. As a result of rigorously excluding all patients who did not stay the course, their final observations are based on only 18 cases, but apparently the incomplete data in the other cases agreed with the findings in the fully investigated cases. The outstanding electrodardiographic changes were confined to lead III and consisted of a prominent, and even deep, Q wave and inversion of T, changes which occurred either together or separately. There was also a tendency for the electric axis deviation to show a shift to the left during the first 6 months of pregnancy and then swing to the right, the angle of axis deviation sometimes being as great as 28°, though it was usually nearer 15°. The important X-ray observation was the backward displacement of the œsophagus by the posterior surface of the heart, seen in 10 cases. Other changes noted were straightening of the left border of the cardiac shadow, prominence of the pulmonary conus, and an increase in the transverse diameter of the heart. The interpretation of these findings seems to be straightforward. The electrocardiographic changes are due to a shift of the heart to the left as a result of the raising of the diaphragm and rotation of the heart in the long axis. Cohn and Raisbeck[2] found similar large Q waves in lead III with rotating leads taken directly from the chest, and Thomson, Cohen and Hamilton[3] noted that the alterations in the Q and T waves were greater when the height of the diaphragm most affected the position of the heart. A strong argument against their being due to cardiac hypertrophy is that in Hollander and Crawford's experience the changes often disappeared towards the end of pregnancy. The radiological changes also, can be explained on the basis of alteration in the position of the heart as a result of the raised diaphragm, but another factor probably comes into play here—the increased blood-volume which occurs during pregnancy and is accompanied by increased cardiac output. This attains its maximum at the 9th lunar month of pregnancy and then decreases steadily during the 10th month until by the 2nd month of the puerperium it has returned to normal.[4] Hollander and Crawford found that the indentation of the barium-filled œsophagus, present in the earlier stages of pregnancy, had practically disappeared by the 34th week of pregnancy. Their suggestion therefore seems valid, that this indentation is due to enlargement of the left auricle as a result of the increased volume of blood to be accommodated in the heart. These observations should facilitate the accurate diagnosis of early cardiac lesions during pregnancy and the puerperium.

The ARMY COUNCIL has decided that serving medical officers may participate in organised discussions, and express opinion, both individually and collectively, on the Government's forthcoming proposals for reorganisation of the civilian health services. Provided the discussions are held in off-duty hours, and Service channels of communication are not used to promote meetings or transmit opinions, there is "not only no objection to but every justification for such discussions being held."

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[1] Hollander, A. G. and Crawford, J. H. *Amer. Heart J.* 1943, 26, 364.

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At least one additional isolation unit, to be situated in South or South-east London, is needed; and every unit should have isolation beds for suspect cases. Cases of abortion should be under the care of a gynæcologist. All maternity units should plan accommodation so as to be able to admit any of their own booked cases which abort; other cases should be fairly distributed between the gynæcological units of voluntary and municipal hospitals.

There should be close liaison between voluntary hospitals and local authorities in planning new accommodation, so as to avoid overlapping.

TRAINING OF DOCTORS AND MIDWIVES

The Royal College of Obstetricians and Gynæcologists consider that medical students should take their midwifery courses at their own medical schools, which means that each teaching hospital should have a maternity unit of about 80 beds. Until necessary building can be completed existing arrangements with LCC hospitals should continue. Provided cases are carefully apportioned there is no reason why the same institution should not undertake the training of both medical students and pupil midwives.

If there is a shortage of domiciliary cases, existing districts at present not recognised for training should be combined into units large enough to conform with requirements. Postgraduate courses for doctors and midwives should be greatly extended at maternity hospitals and general hospitals with maternity units.

ANTENATAL CLINICS

Where a hospital accepts patients from the clinics of a local authority, the expectant mother should be sent to the hospital antenatal clinic for her first general examination, not later than the 32nd week of pregnancy.

The medical officer in charge of the municipal antenatal clinic should have held a resident appointment in a maternity hospital. Arrangements should be made so that the practitioner called to a midwife's case in an emergency shall have seen the patient beforehand and examined her at the 32nd and 36th week. Antenatal clinics should be closely linked with the nearest maternity unit so that special examinations or consultations can be arranged. Health visitor and midwife should coöperate and agree in the advice they give the patient. Dental clinics should be provided in connexion with all antenatal clinics.

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A patient choosing to be delivered at home by the district service of a voluntary hospital must understand that in need the midwife will call in one of the hospital obstetrical staff. In other cases there should be a rota of doctors who can be called in; they should have examined any of the midwife's cases for which they have taken responsibility.

A home-help service should be available, and resident nurseries for young children of a woman during confinement. Mobile obstetric teams should be available to small maternity units and for the patient delivered at home.

POSTNATAL CARE

Care of the newborn has not kept pace with advance in other aspects of obstetrics. Prof. Chas. McNeil of Edinburgh was called in to discuss the task of providing better safeguards for the baby in the early weeks of life.

Maternity units should appoint a pædiatrician to work in close association with the obstetric staff. Maternity units should be more generously staffed with nurses. Health visitors should see the mother a day or two before she is due to leave the maternity ward, or at home before the midwife ceases to attend.

The pædiatric staff of the maternity unit should, through the MOH, take some share in the organisation and clinical work of welfare centres, and breast-feeding clinics should be held daily. Postnatal clinics should review the mother's health during lactation. Postnatal and child welfare clinics should be held at the same time and place.

Convalescent homes should be provided for mothers who need extra rest, and should have a toddlers' wing.

A SINGLE UNIFIED SERVICE

Continuity of care and responsibility cannot, it concluded, be achieved under divided control. A area Maternity and Child Welfare Board for [illegible] London should be appointed by the Minister of Health, with representation of voluntary hospitals, consultants, general practitioners, county and borough councils (including the MOH's) and other welfare authoriti district nursing associations, health visitors and midwives. There should be a small executive of leisured people, with professional and technical advisory panels. A central bureau for collecting daily information about vacant beds might be its first concern. It is hoped that the scheme will be fitted into the coördinated hospital services which are now the immediate concern of King Edward's Fund and the Voluntary Hospitals Committee.

THE EDUCATION BILL

THE far-reaching measures foreshadowed in the Government's white-paper *Educational Reconstruction* in July are embodied in the new Education Bill, published on Dec. 16 (HMSO, pp. 98. 1*s*. 6*d*. Explanatory memo. Cmd. 6492, pp. 14, 3*d*.). The bill gives the President of the Board of Education full ministerial powers, though he will retain his present title, establishes two central advisory councils for education, one for England, the other for Wales and Monmouthshire, provides for the raising of the school-leaving age to 15 on April 1, 1945, and to 16 as soon as the minister sees fit, and makes part-time education, equivalent to one day a week, compulsory for young people up to the age of 18.

The white-paper promised substantial modifications in the provisions for blind, deaf and otherwise handicapped children made in the Education Act of 1921. The new bill extends the duty of ascertainment, now confined to defectives and epileptics, to all children needing special education, including maladjusted children. An important change is that certification is no longer required before a physically or mentally defective child can receive suitable instruction; no child will be certified as mentally defective while he remains within the education system. Local education authorities will be obliged to provide special education for the less seriously handicapped children in the ordinary schools and for the more seriously handicapped in special schools. The age for compulsory attendance at such special schools will be lowered from 7 to 5 years, and parents of a child over 2 years will have the right to ask for their child to be medically examined with a view to special education. Much of the special educational treatment for handicapped children is now supplied by voluntary bodies, and the bill will enable local authorities or the minister to assist these bodies financially.

The bill imposes on local authorities the duty of providing not only for medical inspection as at present, but also for treatment of all pupils at maintained schools and young people's colleges, free of cost. It also makes it a duty of local authorities to provide meals and milk in their schools, and gives them powers to supply boots and clothes for needy children. Independent and direct-grant schools may be included in the arrangements for medical inspection and treatment, as well as school meals and milk, but the expense to the local authority must not be greater than would have been incurred at a maintained school.

The raising of the school-leaving age necessitates changes in the law relating to employment, for the existing acts only refer to the employment of children under 14. The bill empowers local authorities to prohibit or restrict the employment of any child attending a county, auxiliary or special school if it would prejudice his health or education, so that the restrictions of the Education Act of 1921 can be fitted to the new leaving age. As regards limitation of hours of employment, overtime payments and so on, the time spent at a young people's college will count as in working hours.

Dr. **DONALD CAMERON**, professor of neurology and psychiatry at the Albany Medical College, NY, has been appointed to the chair of psychiatry at McGill University and psychiatrist in chief to the Royal Victoria Hospital, Montreal. Dr. Cameron graduated in medicine from the University of Glasgow in 1924.

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Letters to the Editor

INFANTILE D AND V

SIR,—During the spring and summer of this year, when diarrhœa and vomiting in infants was prevalent, we had the opportunity of observing and treating a consecutive series of cases in a London isolation hospital, and our experiences may be of interest in view of your leading article of Dec. 18.

This series of 120 cases, all under 15 months of age, fell into two groups. In the first group of 61 cases (24 dehydrated) treated between April and mid-August inclusive, there were 8 deaths, giving a case-mortality of 13·1%, or 33·3% in the dehydrated cases. In mid-August the routine of treatment was altered by the early addition of human serum to the intravenous drip. In the second group of 59 cases (27 dehydrated) treated between mid-August and November inclusive, there were no deaths; there was also a striking reduction in the length of stay of these infants in hospital. The main points to be observed are:

1. Detailed examination on admission, including an accurate history.
2. Early recognition and treatment of dehydration.
3. Search for, and early treatment of, infective foci.
4. Nursing in a cubicle or by strict bed-isolation technique.

On admission, all infants are given ½-strength Hartmann's (Ringer-lactate) solution by mouth for 12–24 hours, depending on the amount of vomiting. Vomiting usually ceases within 24 hours, after which the infants are put on a dilute feed, beginning with a 1 : 8 mixture of the milk preparation in Ringer-lactate. We have made it a practice to give the infant the kind of food which he had before admission, unless there is some definite contra-indication. The feeds are gradually increased in strength until the infant is on a full-strength milk diet, usually in 5–7 days.

If dehydration is present, fluid is given intravenously without delay, using a Bateman's needle which is tied into an arm or leg vein after cutting down. At first, ½-strength Hartmann's solution is given, with or without the addition of 5% glucose, and the fluid is allowed to drip rapidly (about 30 drops per min.) for the first half-bottle (300 c.cm.). Pooled human serum is then added to the Hartmann's in equal parts (so as to obtain a half-strength dilution) and the rate of flow slowed to 8–15 drops a minute. As a rough guide it may be said that infants under 3 months require a slow flow of 8–10 drops per min., while older children will tolerate a flow of 12–15 drops per min. But in practice it is necessary to judge each case individually. The rate of flow, and the total quantity of fluid given, needs to be adjusted according to the weight of the baby, the degree of dehydration, the degree of pyrexia if any, and the amount of fluid which the infant is able to take by mouth and retain. The drip is continued, giving alternate bottles of Hartmann's plus serum and ½-strength Hartmann's, until dehydration is completely corrected, the stools are less profuse, and the infant is able to tolerate a dilute feed. This is generally in 1–3 days. If vomiting persists, all feeds by mouth are stopped for at least 12 hours and the amount of parenteral fluid is increased. Feeding is then recommenced with ½-strength Hartmann's as previously described.

If the infant is very collapsed on admission, as may happen with a severely dehydrated baby who has had several hours of waiting in an outpatient department followed by an ambulance journey, treatment is instituted exactly as for "surgical shock." Warmth, stimulants such as brandy and nikethamide and oxygen are given, and the infusion is begun immediately. For this purpose, a cutting-down set is always kept ready sterilised. We cannot stress too highly the urgency of treatment in such cases.

This routine and the choice of transfusion fluids are based on the following clinical observations.

1. Most infants with D and V respond well to a preliminary period of starvation, provided it is not too long and that sufficient fluids are given.

2. When dehydration is present, it is essential to deal with it early, since long-continued dehydration may cause irreversible damage, and the chances of recovery appear to [illegible] inverse proportion to the duration of dehydra- [illegible] should point out that with older and fatter babies, in whom the classical signs of fluid-loss are apparent, there is no wrinkling of the skin, but dehydration with loss of tone and elasticity bec obvious if a larger fold of skin (which includes subcutaneous fat) is pulled up between the fin It has also been our experience that profuse diarrhœa is a more important factor than vomiting producing dehydration.

3. When dehydration is severe or of long st the situation is urgent, since there is almost cert loss of plasma-proteins and the condition is akin surgical shock. All workers are familiar with the t of dehydrated infant who at first responds well to transfusion of saline or Hartmann's, and then dev œdema in spite of the fact that he is still del Assuming this to be due to lowered plasma-p it would seem reasonable to give the infant extra teins as soon as possible. In practice, it is simpler use a ½-strength solution of human serum or plasma, this obviates the technical difficulty of getting rather sticky full-strength fluid to run through a sl drip, and also avoids the danger of approaching unknown point at which tissue œdema begins dehydration is not yet corrected. Because there is oft difficulty in getting the drip to start, especially if infant is very collapsed, it is advisable to begin with t half-bottle of Hartmann's.

It is necesary to pay very close attention to the i during intravenous therapy; at the earliest sign œdema—puffiness of the hands and feet, eyes, scro or vulva—the fluid must be discontinued immediat There is certainly danger of "drowning" an infant w too much parenteral fluid, but with careful w this can be avoided, and it is still a far smaller risk allowing an infant to remain dehydrated for a period.

It need hardly be said that it is essential to look f and treat any focus of infection. Sulphonamid especially sulphadiazine, were found to be of great va when given early and in adequate dosage. Spec attention must also be paid to the ears, and myring and if necessary mastoidectomy, must be perform early.

A prerequisite for success with this simple routine is conscientious and coöperative nursing staff; without hard work and intelligent collaboration of the sisters nurses of the barrier-wards in which these infants w nursed, these results could not have been obtained.

Our thanks are due to Dr. W. Gunn, the medical sup intendent, and to Dr. Robert Cruickshank of the N Western Group Laboratory for their advice and enc ment.

M. B. ALEXANDER.
North-Western Hospital, LCC. Y. EISER.

WORK FOR THE DISABLED

SIR,—The Disabled Persons (Employment) Bill three important developments in the formulation policy on rehabilitation. It defines a "disabled person as one "who on account of injury, disease or cong deformity is substantially handicapped in obtaining keeping employment or in undertaking work on his account, of a kind which apart from that injury, dis or deformity would be suited to his age, experience qualifications"—a definition which can be cc with that of the Danish Invalidity Law which ad as its standard inability to earn more than one-third the wages normally earned by an ordinary indivi of comparable status without disability. The bill provision for the preparation of a register of disal persons and it lays down machinery whereby empl with more than 25 workpeople may be compelled to employment for a quota of men whose names appear that register. And the Minister may, after consultat with employers and workers, reserve certain classes work for the exclusive employment of registered pers These far-reaching principles open up a new approach the welfare of disabled persons who are now to "under adequate medical supervision and under stances conducive to the restoration of fitness" for physical training, exercise and occupation the direction of a National Advisory Council with a of district advisory committees.

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It is necesary to pay very close attention to the i during intravenous therapy; at the earliest sign œdema—puffiness of the hands and feet, eyes, scro or vulva—the fluid must be discontinued immediat There is certainly danger of "drowning" an infant w too much parenteral fluid, but with careful w this can be avoided, and it is still a far smaller risk allowing an infant to remain dehydrated for a period.

It need hardly be said that it is essential to look f and treat any focus of infection. Sulphonamid especially sulphadiazine. were found to be of great va when given early and in adequate dosage. Spec attention must also be paid to the ears, and myring and if necessary mastoidectomy, must be perform early.

A prerequisite for success with this simple routine is conscientious and coöperative nursing staff; without hard work and intelligent collaboration of the sisters nurses of the barrier-wards in which these infants w nursed, these results could not have been obtained.

Our thanks are due to Dr. W. Gunn, the medical sup intendent, and to Dr. Robert Cruickshank of the N Western Group Laboratory for their advice and enco ment.

M. B. ALEXANDER.
North-Western Hospital, LCC. Y. EISER.

WORK FOR THE DISABLED

SIR,—The Disabled Persons (Employment) Bill three important developments in the formulation policy on rehabilitation. It defines a "disabled person as one "who on account of injury, disease or con deformity is substantially handicapped in obtaining keeping employment or in undertaking work on his account, of a kind which apart from that injury, di or deformity would be suited to his age, experience qualifications"—a definition which can be co with that of the Danish Invalidity Law which ad as its standard inability to earn more than one-third the wages normally earned by an ordinary indivi of comparable status without disability. The bill provision for the preparation of a register of disal persons and it lays down machinery whereby empl with more than 25 workpeople may be compelled to employment for a quota of men whose names appear that register. And the Minister may, after consultat with employers and workers, reserve certain classes work for the exclusive employment of registered pers These far-reaching principles open up a new approach the welfare of disabled persons who are now to "under adequate medical supervision and under stances conducive to the restoration of fitness" for physical training, exercise and occupation the direction of a National Advisory Council with a of district advisory committees.

Leach's statement, Dr. Leach was assured that the identity and character of our service would be maintained. A week ago we had a meeting of elected representatives of the Highlands and Islands subcommittee of the BMA. with representatives from Caithness, Sutherland, Ross-shire, Inverness-shire, Argyll and the Burgh of Inverness. Every person present agreed that our service should be maintained as at present, and valuable suggestions were put forward for its further improvement. This is not the opinion of medical practitioners alone; it is the opinion of the people whom we serve. We do not wish our service ruined, or even belittled by people who know nothing of our past, our sufferings, and what this service has meant in giving hope to our people, and relieving them of much of the suffering that their forbears had to go through. We have a service of which we are proud to be members in spite of our isolation.

Tain, Ross-shire. ENEAS K. MACKENZIE.

FEEDING WITH AMINO-ACIDS

SIR,—Your editorial on feeding with amino-acids (*Lancet*, 1943, i. 143) has provoked discussion, and one of the authors mentioned therein has already taken exception to your comments (*Ibid*, 1943, ii. 275). As the first one to use amino-acids in the human as a method of intravenous protein alimentation, I was struck immediately with the fact that your leader seemed to misunderstand many fundamental considerations regarding parenteral therapy and about clinical research in this country. While my first impulse was to take up these misunderstandings in turn, I would prefer to express rather my personal pleasure at the publication of this editorial because it means that this new therapeutic procedure, which was started in this country nearly 5 years ago, has already been deemed important enough to be discussed (though somewhat belittled) by our esteemed English contemporaries.

Parenteral injections have perhaps reached a wider use in this country than elsewhere, although their value in lowering surgical mortality and minimising surgical complications is recognised everywhere This is true because such injections not only correct serious biochemical deficiencies but actually meet several daily nutritional needs of patients temporarily unable to take anything by mouth or in whom the oral ingestion of fluid or food would prove deleterious. The addition of appropriate amino-acid mixtures to the four other nutritional elements now extensively used enables the surgeon to avoid many of the deleterious effects now known to follow protein deficiencies, particularly post-operative hypoproteinæmia. In fact, this new procedure is a physiological short-cut, circumventing the need for the gastro-intestinal tract so often temporarily out of commission. Plasma transfusions, true enough, may also be used to give parenteral protein nourishment and have many advantages, particularly in acute hypoproteinæmia, but are scarcely as physiological, nor as inexpensive or convenient, as an injection of an appropriate mixture of amino-acids. Amino-acid mixtures have also been given by mouth but only to spare digestion, which is so necessary if whole protein food is to be absorbed, and is occasionally impaired, for example, by pancreatic achylia and nutritional œdema of the gastro-intestinal mucosa.

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OXFORD VAPORISER

SIR,—I fear the brevity of my report* has persuaded Wing-Commander Soper to misread between the lines in some places. The cases dealt with were of a particular class—namely, prolonged and often repeated operations on men who had sustained recent severe wounds. I do not consider ether the *ideal* anæsthetic for these cases, although at the time it was the best available. Nitrous oxide and oxygen in a closed circuit, with cyclopropane or ether as adjuvants, would have been preferable. I tried to point out how the use of the Oxford Vaporiser minimised the disadvantages of ether, rendering [illegible] insufficient to outweigh the advantages of portability. Soper suggests premedication two hours before operation; I have found one hour most likely to bring about amnesia. Moreover a dry mouth for two hours in a hot climate is very uncomfortable, and shortage of nursing made two injections impracticable. "Unpleasant" is a relative term and I wonder if Soper's grateful patients would not have been even more grateful for an induction with 'Pentothal.' When I used a chloroform-ether mixture during induction the average amount of chloroform used was two drachms, administered on an open mask held an inch or two from the face. The small quantity of chloroform thus absorbed was sufficient to tide over the difficult transition. During the very busy period covered by my report (we might be operating 18–20 hours a day) time was of major importance, and on the occasions when I decided not to use chloroform a little CO_2 helped to speed up the induction. As to oxygen, the two best prophylactics against the toxic effects of prolonged ether (or chloroform) are, in my experience, glucose and excess oxygen.

At the end of my report I compared the Oxford vaporiser with the "tin can" vaporiser, because several anæsthetists in the Middle East had suggested that the latter was just as good. I have used the tin can when running more than one table with only one machine, and I have found that if the tube connecting the can to the patient is narrow there is too much obstruction to breathing; if, on the other hand, the tub [illegible] is a dead space with accumulation of CO_2 and heavy breathing which may exhaust the patient.

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ON THE FLOOR OF THE HOUSE

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When the House reassembles in the New Year one of its first duties will be a two-day debate on the Education Bill, the text of which has just been published. It is a long document running to 97 pages, with 111 clauses and 9 schedules. Provision for the examination of [illegible] requiring (or likely to require) special educational treatment will show the education authorities in all areas the extent of their liabilities more fully than at present. The facilities for medical treatment of school-children will need to be extended as it becomes the duty of every

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An industrial medical officer who spends his whole time going about factories in the city thinks that so far influenza has only slightly interfered with production, and then mainly in the smaller firms where key men are off work. In his view the public, especially those who do not remember 1918, do not yet realise the potential significance of an influenza epidemic, though factory managements are now showing some concern at the possible stoppage of work. He has seen clear evidence of the influence of working conditions on absence rates; where factory hygiene is good and overcrowding minimal there is less risk of spread; in one factory where both personnel and plant are overcrowded 20–25% of the workers have been down with the flu.

Taking an average over the year, the sick-absence rates in Birmingham factories stand at around 2–4% for men and 5–6% for women. The rates at present show about a threefold increase, with absences of 12–15%. Some firms keep a weekly analysis of sickness-benefit claims, which shows the number of people off duty with each ailment, but not the time lost. In one such works, employing 5000 men and 5000 women, the sickness claims listed under influenza for the four weeks, Nov. 20, 27, Dec. 4, 11, were 22, 55, 72 and 49 for men, and 17, 53, 61 and 35 for women.

Among the remedies used in Birmingham factories are gargling, spraying of rooms, and the use of ultraviolet light, but very few seem to know anything of aerosols, oiling of floors and so on. The Ministry of Health mask, recommended so strongly two years ago, has not been taken up, mostly because workpeople hate to think they look foolish. The industrial medical officer already quoted maintains that the most important preventive measure as far as industry is concerned is the diminution of fatigue by reducing hours of work. The workman is naturally averse to reducing his hours and therefore his wages, and as a result men in the heavy industries in Birmingham are still working 65–80 hours a week. The maximum hours for women, 54 per week, are often being worked, in addition to home duties.

HOSPITAL EXPERIENCE

An EMS hospital admitting Service and civilian sick from the Birmingham area, as well as patients from the wards of the city hospitals, noted a sharp rise in admissions of acute respiratory infections beginning on Nov. 17. The influenzal cases admitted were mostly mild, the predominating symptoms being headache, backache, general aching of the limbs, coryza, often with long paroxysms of sneezing, moderate sore throat and slight cough. Temperatures from 100° to 103° F. The patients were flushed, with conjunctival injection, coated tongue, and injected pharynx. The lungs were either clear or exhibited a few scattered rhonchi. Symptoms and fever usually lasted 24–36 hours, and rarely more than 48 hours after taking to bed. The patients were allowed up when their temperature had been normal for 48 hours, and were mostly fit for discharge 10 days after admission. This hospital admitted 23 cases of bronchopneumonia and 1 of lobar pneumonia during November. All except one of these responded well to sulphamezathine; the one exception being probably a case of atypical pneumonia in which the temperature fell by lysis during the 6th to 8th day after admission. The only complication encountered was a pleural effusion in a woman of 22. Most of this hospital's cases were in young adults; there were no deaths.

Nurses have been badly hit by the epidemic. Up the second week of December the numbers affected Birmingham hospitals were roughly as follows:

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The school medical officer reports that for November the attendances at the elementary schools were only 4% below the average. This confirms the experience at the Children's Hospital, where out of 54 admissions to the medical side in the three weeks up to Dec. 11 only 10 were labelled upper respiratory infection, compared with 9 out of 52 admissions for the same period of 1942. About half of the 10 admissions were probably for complications of influenza, though without a family history this would not have been detected. On the other hand, about half of the children in the hospital's day nurseries are said to be affected, and about a third of the nursery staff. At the Ear and Throat Hospital the number of children requiring paracentesis has doubled, compared with normal times; these cases have cleared up in outpatients without complications. There has also been a definite increase in acute suppurative otitis media in adults.

At the General Hospital, among 19 cases of influenzal pneumonia seen by one physician there have been 3 deaths. The women with pneumonia all told the same story—battling with a cold for some days to keep the home going, and a sudden chill while standing in a shopping queue. Two of the fatal cases—a young man and a middle-aged woman—showed heliotrope cyanosis; the third was in a woman near term with her fourth child. The pneumonia in these 19 cases was unaffected by sulphonamides; physical signs were slight but X-ray shadowing sometimes surprisingly dense. The onset was sudden, temperature often 104° F., headache severe, pleurisy rare, cough slight if no previous bronchitis; sputum scanty and only occasionally bloodstained. Defervescence was gradual.

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A ship from North Africa arrived in a West Scottish port on Nov. 24 with a case of confluent smallpox on board, a soldier, aged 23. He had sickened on Nov. 15 and had been admitted to the ship's hospital next day, and was diagnosed smallpox on Nov. 19, thereafter being isolated in one of the cabins adjacent to the hospital. This cabin was entered from an alleyway, with access to it through the ship's hospital. The patient had been vaccinated, unsuccessfully, on Aug. 5, 1942, this being his first vaccination.

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TABLE II—HEALING RELATED TO AGE OF WOUND

Time of wound excision	Total	Healing: 1st intention	Infections	Primary healing (%)
24 hours	188	173	15	92·0
48 hours	40	39	1	97·5
72 hours	31	27	4	87·1
4 days	17	15	2	
5 days	9	7	2	
6 days	3	—	3	
7 days	2	2	—	
8–10 days	3	3	—	
Total ..	293	266	27	

ANÆSTHESIA

More and more as the campaign went on we came to rely on local anæsthesia given in the form of a regional block of 1% 'Novutox,' with a basal narcosis of omnopon (gr. 1/3) and scopolamine (gr. 1/50). Usually this was sufficient alone, and the criticism that it is too exacting for the battle casualty was not borne out by the testimony of our patients. The contra-indications were wounds involving the eyes or ears, in which a satisfactory regional block could not be obtained, or patients in a state of uncontrollable restless confusion. It is just these latter cases which provide the biggest problem in smooth general anæsthesia, but this was always provided by Major R. P. Harbord, using endotracheal cyclopropane or following induction with a small dose of 'Pentothal,' by a continuous drip of ½% pentothal solution.

TABLE III—PRIMARY OPERATIONS

Type of case	No. of cases	Deaths	Healing 1st intention	Infected wounds*	Complications
Scalp wounds	139	—	135 (97·1%)	4	1 extradural abscess
Fractures (dura intact)					
Depressed ..	45	—	41	4	Sequestration, 1
Fissured ..	7	1	5	1	—
Sagittal sinus injury	2	—	2	—	—
Air sinus and eye wounds	9	—	5	4	Sinusitis, 1; rhinorrhœa, 1
Face wounds	1	—	1	—	—
Ear wounds	5	—	4	1	Mastoiditis and subcutaneous abscess, 1
Total ..	69	1	58 (84·1%)	10	
Open brain wounds					
Perforating brain wounds (metal indriven	51	12	35	7	Cerebral fungus, 4; meningitis, 4; cerebral abscess, 1; fits, 1; cerebrospinal fluid leak, 2
Compound fracture (indriven bone only)	24	5	19	3	Cerebral fungus, 2; meningitis,1
Compound fracture (dura torn)	10	—	9	1	Fits, 2
Air sinus and eye-brain wounds	7	2	5	1	Pulmonary embolus, 1; rhinorrhœa, 1
Ear-brain wounds	3	2	1	—	Mastoiditis, 1
Face-brain wounds	1	—	1	—	—
Sagittal sinus brain wounds	6	3	3	1	Sagittal sinus thrombosis, 1
Total ..	102	24 (23·6%)	73 (71·6%)	13	
Grand total	310	25	266	27	

* Including wounds left open.

OPERATIVE TREATMENT

There is no doubt that the surgeon who first operates on an open brain wound makes or mars it. There is no useful first-aid operation—ideally, the initial operation should be the final and complete one. Failure to obtain primary union or inadequate removal of indriven bone fragments all too frequently means the vicious circle of cerebral fungus, abscess and meningitis.

The first step is adequate excision of the contaminated scalp through all layers, including any side lacerations or undermined flaps. This is in contrast to the general trend of war surgery elsewhere in the body, where skin excision is becoming more and more sparing. At the same time, it must be remembered that the wound has to be closed, and for this reason every available millimetre of healthy skin must be preserved.

The next step is the removal of all loose fragments of bone and excision of the bone edges until the dural rent is fully exposed. Care should be taken to avoid extensive baring of the surrounding bone. Elevated or depressed flaps with sound periosteal attachments may be left behind.

The dura is treated conservatively and only obviously contaminated tags are excised, while the brain track is cleaned out with gentle suction and irrigation. The object should be to remove all indriven bone fragments, together with the surrounding pulped brain and indriven hair and dirt. Metal is nearly always sterile and need not be removed unless it presents itself. In only a few cases in this series did we fail to secure all the indriven bone chips.

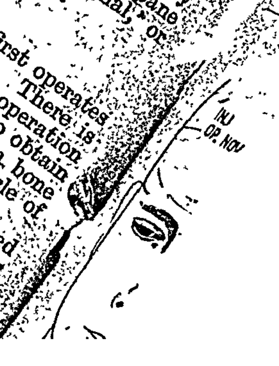
TABLE IV—SECONDARY OPERATIONS (PREVIOUSLY OPERATED ON BY GENERAL SURGEONS)

Type of case	No. of cases	Deaths	Healing 1st intention	Infected wounds	Complications
Scalp wounds	4	—	3	1	—
Compound fractures	2	—	1	1	—
Open brain wounds	9	1	3	4	Encephalitis, 1; mastoiditis, 2; cerebral fungus, 1
Total ..	15	1	7	6	

The final closure is the crucial part of the operation. The rule is complete and accurate suture of the scalp without tension. Two layers of fine interrupted waxed silk, one in the galea and one in the superficial skin, is the ideal, and the skin layer can be removed in three days; but one layer of silk through and through may be satisfactory, providing the stitches are placed exactly at the right tension and are left in place a few days longer. "The difficulty, of course, in scalp closure arises when the wound edges cannot be approximated except under tension. Then the unerring rule must be to extend the incision in an appropriate manner, in order to mobilise and release loose portions of the scalp to fill the gaps. The methods used (fig. 2) vary according to the circumstances: sometimes extension into a simple flap will do it; at other times modifications of the Cushing triradiate or "Isle of Man" incision are simplest; or a flap may have to be swung sideways across the defect. In this series it was never found necessary to leave bare areas elsewhere in the scalp, as is sometimes advocated.

A hoar-frost dusting of sulphathiazole powder to the wound before closure was used as a routine, and a small corrugated rubber stab drain was inserted for 24–4 hours.

Slight modifications were made in this technique for special types of wounds, though the general principles were adhered to. In one or two air-sinus brain wounds, the dura was closed with a free fascial graft, though as a rule, owing to limited exposure, we preferred to delay this repair.



nerously of his knowledge and experience of respiratory medicine and the lessons learned from his method of approach to clinical problems are abiding. He never relied overmuch on the stethoscope, but was able to get more accurate information from a skiagram than most men, while his power of description and choice of words enabled him to impart his findings to others. He was not, however, exclusively, or even predominantly, "radiologically-minded": he was a shrewd clinician in the broadest sense, giving due weight to the history and frequently using with advantage for diagnosis and prognosis the physical characteristics and mental reactions of a patient. Fine physician and brilliant speaker though he was, it was in an armchair round the fireside that Burton Wood excelled. In this intimate atmosphere he delighted to discuss a wide range of subjects and his guest would always leave wiser than he came.

Notes and News

RED SQUILL FOR RATS

Blue squill charms the eye with its inflorescence, its white bulb comforts the bronchitic, and the red variety demolishes rats; so that man has reason to cherish and admire the little lily. Among rat poisons red squill stands high; Dr. Morgan's total war on rats, described in this column last week, commended its use, "if you can get it." Of late none has been available from Sicily or Malta. Arsenic and zinc phosphide are plentiful, and are good poisons if properly used, but some think that results could be achieved more quickly with strychnine—a painful and undesirable poison not at present permitted. Rats have been breeding fast in the dock areas, and the Pharmaceutical Society have been considering whether they should ask Mr. Herbert Morrison to release strychnine for killing them. Fortunately this should not be necessary. A cargo of red squill has arrived from North Africa and another is expected. Defestation of the dock areas and warehouses will be hastened by this well-timed argosy.

University of Cambridge

On Dec. 11 the degrees of MB, B CHIR were conferred on J. R. Handforth by proxy. At recent examinations the following were successful:

Part I: surgery, midwifery and gynæcology.—M. S. Adams, C. G. Attenborough, H. H. E. Batten, T. S. L. Beswick, P. L. Blaxter, K. A. C. Bowen, D. Brazier, D. W. Burnford, J. D. Burton, I. J. Carré, I. R. Clout, A. Comfort, R. P. Cook, P. J. Coope, P. B. S. Cooper, P. D. B. Davies, C. D. Drew, E. D. Dyson, R. D. Eagland, D. A. W. Edwards, F. H. Epstein, D. M. Evans, M. Farquharson, J. J. Fleminger, M. A. Floyer, P. H. Friedlander, J. W. Fullerton, S. A. M. Garibian, H. M. Giles, M. T. Gillies, M. L. Graeme, C. R. H. Green, J. A. Harrington, C. E. Hartley, G. Hartridge, F. N. Hicks, I. S. Hodgson-Jones, C. B. Holmes, N. S. Hooton, R. C. A. Hunter, G. I. C. Ingram, R. E. Irvine, D. G. James, M. C. Joseph, E. M. Kingsley-Pillers, A. G. Leatham, J. Lorber, P. F. Lucas, D. W. R. Lyle, M. B. McIlroy, I. L. McKelvie, R. M. MacPhail, I. A. Magnus, S. M. Martin, M. B. Matthews, P. D. Mort, M. W. L. Mutch, K. N. V. Palmer, T. J. S. Patterson, J. C. R. Payne, P. B. Philip-Smith, K. L. Prendergast, P. D. G. Pugh, K. E. E. Read, M. K. E. Reaney, T. J. Rendle-Short, J. Roche, L. J. Rowley, R. C. Roxburgh, F. A. R. St. John, B. Schofield, F. D. Schofield, H. F. Sebag-Montefiore, J. A. Shiers, J. F. N. Sidebotham, K. W. Symons, M. Symons, W. E. W. Tilleke, J. H. M. Tilley, M. M. Tunstall-Behrens, R. G. Turner, J. Upsdell, D. R. D. Vanstone, D. G. Veater, N. T. Welford, D. P. Wheatley, B. J. Whitfield, A. P. Wingate, R. A. Womersley, K. A. A. Wray, G. S. Yeoh.

The board of research studies has approved Dr. Dorothy Russell for the title of the degree of D Sc.

Medical Awards

The following awards have been made in recognition of gallant and distinguished services in Burma and on the eastern frontier of India.

CBE.—Colonel Bijitendra Basu, OBE, IMS.

OBE.—Lieut.-Colonel C. F. J. Cropper, BA OXFD, MRCPE, IAMC; Colonel Charu Chandra Kapila, MRCP, IAMC; Colonel J. A. Mathison, MB, RAMC; Colonel Manfred Morris, MD MANC., RAMC; Lieut.-Colonel Victor Perez, MD LOND., RAMC.

MBE.—Major G. D. W. Adamson, LRCPE, RAMC, Asst. Surgeon (British cadre) A. V. Barker, IMD; Captain J. B. Hurll, MB GLASG., RAMC; Major J. S. Kerss, MB EDIN., RAMC; Captain J. G. Scott, MB DURH., RAMC; Subadar V. D. Sharma, IAMC; Major J. F. Shepherd, FRCS, IAMC; Subadar C. Singh, IAMC; Major L. S. F. Woodhead, MRCS, IAMC.

DSO.—Lieut.-Colonel G. R. Marshall, MRCS, RAMC.

MC.—Captain N. P. Mahapatra, MB., IAMC.

By permission of the Privy Council the name of the Chartered Society of Massage and Medical Gymnastics has now been changed to The Chartered Society of Physiotherapy.

University of Manchester

At recent examinations the following were succ

O. E. Adeniyi-Jones, J. R. Archibald, Margaret A. Kathleen M. Brown, Alice I. Burke, Margaret A. Bur Clarkson, Hyman Davies, I. L. Gregory, E. J. Guest, Jac liffe, C. L. Holden, Edmund Isherwood, G. W. H. Jame Johnson, Friedrich Kratter, R. McK. Laslett, Alan. M T. M. Martin, Thomas Moss, J. F. O'Grady, Arthur F. C. Reidy, M. M. Rose, James Sharp (with distinction in and medicine), and Elizabeth Travers.

King Edward's Hospital Fund for London

The Duke of Gloucester speaking from the chair at a of the Fund on Dec. 14 announced that £280,000 wa being distributed among the voluntary hospitals. A grant of £5000 had been made to St. Thomas's to he expenses at its country branch at Godalming whic indirectly due to the war damage to the main hospi £4000 to Charing Cross as a first instalment toward building on a site which has yet to be determined year £5000 had once more been set aside to encour establishment of group preliminary training sch nurses. Not long ago only 20 of the 85 training hos the fund's area had schools; soon there would be a dozen without one. Referring to the fund's re hospital diet the Duke announced that several hospi already sought their advice and he was therefore ap a committee with Prof. J. C. Drummond, D SC., s adviser to the Ministry of Food, as chairman. Sir Jameson would also be a member and Miss Margaret had been appointed dietetic adviser.

Appointments

MILLS, HERMIA, MB LOND.: MO at Holloway Prison.

READ, J. C., MRCS, LDS: medical registrar at the Roya Hospital, London.

SOUTHWELL, NEVILLE, MB CAMB, MRCP: medical tutor an medical registrar at Guy's Hospital, London.

Births, Marriages and Deaths

BIRTHS

BICKFORD.—On Dec. 15, at Bolney, Sussex, the wife of Sq Leader B. J. Bickford, FRCS—a son.

JOHNSON.—On Dec. 15, in London, the wife of Lieut.-Colon Johnson, RAMC—a daughter.

MOLE.—On Dec. 6, at Crediton, the wife of Captain R. H. RAMC—a daughter.

NEILL.—On Dec. 7, at Oxford, to Dr. Joyce Neill (formerly Davies) wife of Mr. Desmond Neill—a daughter.

NICHOLL.—On Dec. 4, at Lewes, the wife of Surgeon Lie Geoffrey Nicholl, RNVR—a son.

RAINEY.—On Dec. 15, at Harleston, Norfolk, the wife of Lieutenant R. E. Rainey, RNVR—twin daughters.

RATCLIFFE.—On Dec. 14, at Derby, the wife of Mr. J Ratcliffe, FRCS—a daughter.

STEVENS.—On Dec. 7, in London, the wife of Major C. P. RAMC—a daughter.

SYMONS.—On Dec. 13, at Moretonhampstead, the wife o H. M. SYMONS, RAMC, of Ballarat, Australia—a son.

MARRIAGES

HERFORD—CRAGO.—On Dec. 15, at Clifton, Bristol, Martin MBE, MC, MB, major RAMC, to Mary Crago, MB.

McBRYDE—DAVY.—On Dec. 18, at Hale, J. R. McBryde, The Border Regiment, to Elisabeth Joan Davy, lie RAMC.

OSTROWSKI—WIGHTMAN.—On Dec. 16, in Edinburgh, Maria Ostrowski, MB. CH B, 2nd lieutenant Polish Pa Unit, to Helen Mary Wightman.

PICKERING PICK—NETTELFIELD.—On Dec. 11, at Pyrford, Pickering Pick, MRCS, surgeon lieutenant RNVR, Nettelfield.

DEATHS

DUFFIELD.—On Dec. 17, at Bournemouth, Ernest Alphonse MRCS.

JOLY.—On Dec. 14, in London, John Swift Joly, MD DUBL aged 66.

TROUTON.—On Dec. 16, at Rotherfield, Sussex, Gardiner Trouton, TD, MD DUBL., aged 85.

WILLIAMS.—On Dec. 15, John Robert Williams, MB ED Penmaenmawr, aged 81.

WILLIAMS.—On Dec. 14, at Midhurst, Sussex, Reginald Williams, MD LOND., JP, aged 83.

WILSON.—On Dec. 12, Roger Parker Wilson, CIE, FRCS, DPH, colonel IMS. retd.

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